THE LANCET.

VOL. II.] LONDON, SATURDAY, MAY 31, 1834. [1833-34.

UNIVERSITY OF LONDON.

LECTURES
ON
COMPARATIVE ANATOMY
AND
ANIMAL PHYSIOLOGY,

DELIVERED BY

ROBERT E. GRANT, M.D., F.R.S.E., &c., &c.;

Fellow of the Roy. Coll. of Physicians of Edin.; and Professor of Comparative Anatomy and Animal Physiology in the University of London.

LECTURE XXXII.

ON THE MUSCULAR SYSTEM OF THE MOLLUSCOUS CLASSES.

THE general form of the body, and the kind of motions it performs, vary more in the molluscous than in the articulated classes of animals, and we observe a corresponding diversity in their active organs of motion. In the articulated classes we can distinctly perceive the principles according to which the muscular system is modified and changed, and that the general plan remains throughout those long cylindrical animals essentially the same; but in the molluscous classes there appear much greater variety, diversity, and want of symmetry, in the whole muscular system; and although a uniform plan can be occasionally traced through numerous distinct forms, yet there are other forms of the active organs of motion belonging to this division which appear at first difficult to be reduced to a common type, or to be reconciled with each other. Many of the lower mollusca, as these *bolteniæ* and *clavelinæ*, are fixed by long peduncles at the bottom of the sea; some, as the *limaces*, creep on the surface of the dry land; the *pteropods* swim at the surface of the ocean, where the *janthinæ* hang suspended by floats; the naked *cephalopods* bound from the surface, and the *pholades* are fixed deep in cavities of rocks at the bottom; the oyster is fixed to the rock, while the clam skips to and fro by the flapping of its shells; the *pinna* is anchored to the bottom by its strong byssus, while the cardium swims along the still surface, suspended by its concave expanded foot. So that, although none of these animals have wings to fly through the air, or jointed legs to creep upon the land, or spines to oar them through the sea, they possess the means of almost every kind of motion, from the vibratile cilia of the fixed corals to the hands and feet of the finny tribes.

Notwithstanding the soft and gelatinous appearance of most of the tunicated animals, resulting from the want of calcareous matter in their exterior covering, we observe their muscular system to be distinctly fibrous and highly irritable, a development corresponding with that of their nervous system, which already presents ganglia in the lowest compound or aggregate forms of these animals, as in the *botryllus* and the *pyrosoma*. The most active and constant motions of the tunicated animals, which are alike performed by the compound and the simple kinds, are those by which currents of water are directed into the respiratory sac for the aeration of the blood, and to bring food to the mouth which is placed at the bottom of that sac. These constant incurrent and excurrent streams here, as in the conchiferous animals, are produced, not by motions of the ordinary muscular or elastic coverings of the body,—for while these currents continue with smoothness and regularity inwards through the branchial aperture, and outwards through the anal, you perceive that the animals remain fixed and motionless in every visible part,—but by the rapid vibration of minute cilia disposed around the meshes of the numerous respiratory laminæ on the interior of the general sac. The same vibratile organs which we saw in the minutest polygastric animalcules, and in the most plant-like forms of zoophytes, continue through the

articulated and molluscous classes to the vertebrated amphibia, the highest of water-breathing animals. By these the currents are conveyed inwards to the general sac, through the surrounding orifices in the fixed and spreading botryllus, and are expelled through the central vent. By these vibratile organs the currents rush inwards through the projecting papillæ of the *pyrosoma* (*Fig. U, 2, c c, page* 426, *vol.* 1) to the respiratory sacs of the numerous animals composing these shining tubes, and by these currents passing through the vents, which here are directed into the general tube of the body, open at its lower extremity, they carry upwards the entire animals, shining like columns of fire, through the dark and silent deep. The same is the mode of respiration and progression in the luminous *biphoræ* or *salpæ*, shining in myriads, aggregated together in various modes, on the still surface of tropical seas. So that in the lowest mollusca, as in the lowest radiated animals, we still find those minute vibratile organs subservient alike to progressive motion, to the aeration of the fluids, and to the obtaining of food. These active organs belong alike to the larger simple and the smaller compound tunicata, and to all the acephalous mollusca, whether fixed or free, naked or testaceous.

In almost all the forms of these tunicated animals, but most distinctly in the larger and isolated kinds, we find within the exterior tunic, which we have already considered as analogous to the two valves of the conchifera, a distinct muscular tunic, and that muscular tunic has several attachments to the exterior cartilaginous covering. Within this cartilaginous tunic in the *ascidiæ*, you can distinctly perceive that there is an internal layer of a muscular or fibrous structure, which is exterior, however, to all the viscera, and even to the gills. These muscular fibres, as you perceive in this *cynthia pupa* (*Fig.* 130), are strongly and distinctly marked within this exterior elastic tunic, and they cross each other in various directions in different species, so as to be able to contract the exterior covering at all points. They are attached to the exterior cartilaginous coat at different points, but especially at the two orifices, so that they act powerfully upon it near to the respiratory orifice, and at the anus. The general tendency of the simultaneous contraction of all this muscular coat is to draw the animal downwards towards its fixed point, most of those larger and isolated forms of tunicated animals being fixed to rocks. There are strong muscular fasciculi disposed here, like sphincters (*Fig.* 130, *d e*), which tend to close forcibly the respiratory orifice (*Fig.* 130, *a*) and the anal (*Fig.* 130, *b*). This appearance and the various

Fig. 130

directions of the muscular fibres are beautifully shown in these plates of the dissected tunicata given by Savigny and by Baron Cuvier.

This muscular coat is analogous to the fleshy mantle of higher mollusca, and is seen, though less strongly developed, in the lowest of the compound tunicata. The interrupted longitudinal fibres are seen to radiate thus (*Fig.* 130, *a*) from the circumference of the branchial orifice, and to extend over the whole surface of the sac in numerous small bands. These fibres are traversed by others, which commence and radiate in the same manner from around the margin of the anal aperture (*Fig.* 130, *b*), and these also extend in minute fasciculi over the whole sac. The sphincter of the branchial opening (*Fig.* 130, *d*) is larger and broader than the corresponding muscle (*Fig.* 130, *e*), around the anal orifice of the sac. Upon touching those simple *ascidiæ* in the living state, which we often find covering the entire surface of rocks in the sea, the respiratory cavities of which are filled with water taken in to aerate the branchiæ contained within this muscular tunic, each animal, contracting itself upon being touched, throws out a jet of water to some distance from its sac. Sometimes they are so closely compacted together on the rocks that the impression given to one causes it suddenly to retract, which acts also on the one next to it, and so on throughout several of them, and each in contracting throws out a quantity of water. They are kept in that distended state by the natural elasticity of the external tunic, and by the water contained in the sac. There is no muscular apparatus for that purpose any more than there is to enable a bivalved shell to open; that is done in the conchifera by the natural elasticity of the ligamentary attachment of the valves. It is by the ligamentous attachment in the one case, and by the natural elasticity of the tunic in the other. In the interior of

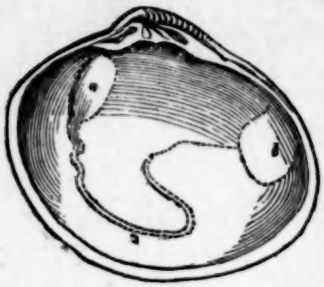
this muscular coat of the tunicata are contained the digestive apparatus, and also the respiratory organs, in the form of numerous laminæ, variously disposed, sometimes with apparent irregularity, in longitudinal rows, over the surface. The circulating system is also enclosed here, consisting of arteries and veins, and the nervous system with its several ganglia. But we do not observe any muscular apparatus around the mouth at the bottom of this sac, for the purpose of seizing the prey or food which is brought to the animal along with the water taken in for respiration. The mouth of the animal is the entrance to the stomach, and is very remote from that branchial orifice through which the water is introduced to the general respiratory sac. There are commonly numerous small tentacula seen moving about in different directions disposed around the exterior respiratory orifice, and which can be entirely retracted within the sac, and enclosed by the sphincter muscle. These delicate organs of sense have no influence in the production of the currents which rush through that orifice into the sac.

The *conchifera* are much more generally free than the tunicated animals, although many of them are also fixed,—sometimes, as in the oyster, by depositing calcareous matter from the margins of the shell when the animal is young, thus gluing itself to the rock on which it is fixed. In the *pinnæ* and many others, the delicate shells are protected by the animal being fixed by numerous filaments that are secreted by a gland at the base of the foot. These suspended mytilaceous animals can move themselves to and fro, to a certain extent allowed by the length of the byssus. Many of these conchiferous animals we find moving about by very different means. Some, as the *pecten*, striking their valves forcibly together by their adductor muscle, move backwards, with the hinge of the valves moving first. Others, again, as the pholades, the *saxicava*, and many other genera, we find piercing rocks, and advancing deeper into the mass as they grow larger, and the *teredo* in the same manner perforates timber. Some *conchifera* burrow in mud or in sand, and extricate themselves at pleasure; some swim on the surface, some creep on rocks, and these various motions are chiefly performed by the foot.

The foot of these animals is an organ of great importance, from the various uses for which it is employed. This muscular foot, which you see in the common muscle (*Fig. W, f, page* 429, *vol.* 1), extending from the middle of the body, shaped like a tongue, convex on its anterior surface next to the head, but grooved along its posterior surface on the side next to the anus,—this is the highly sensitive and irritable organ by which many of the conchiferous animals are enabled to creep upon a solid surface, to swim along the surface of the water by forming the foot into a hollow cavity, like a boat, and then communicating to it a slight vermicular motion; by this concavity a quantity of the water is displaced, and the animal is thus enabled to hang down suspended from this cup-like organ. But we perceive that this muscular foot, ascending on each side of the viscera to be attached to the upper part of the two valves, generally embraces these organs like a muscular sheath. This foot is often entirely wanting, as where the shell is glued to the rocks. Its muscular fibres decussate each other in all directions. By this organ many species can excavate for themselves deeper cavities in the sand or mud, from which they can as easily escape, by pushing downwards this long fleshy organ. We find many of the conchiferous animals, as the solens, employing this muscular organ for extricating themselves from the sands during the recess of the tide. It is employed thus in various ways for progressive motion. It is this organ which they employ to fix externally those horny filaments which are secreted by a gland at the base of the foot. This is at first a thin limpid matter which is conveyed along the groove of the foot, and is applied to the surface of some external solid body. The foot is then gradually retracted from the filaments; and the filaments, from being soft, consolidate, and appear to be continuous with the muscular fibres which ascend to the dorsal part of the valves. Although the foot is of such varied utility to the species which possess it, this is far from being the most constant or the most general part of the muscular apparatus. Its form even varies considerably in different animals.

The adductor muscles which connect the valves together on their ventral part, and serve to close them forcibly together, are important organs for the protection of these animals. Sometimes there is but one muscle, but the greater part of this class have two of these adductor muscles, which leave distinct impressions on the valves (*Fig.* 131, *a*, *b*). They are the largest and strongest muscles of the body. They consist of numerous short straight fibres, parallel to each other, and passing across from one valve to the other, leaving those large circular impressions which we have seen so generally upon the inside of these shells. This muscular attachment

Fig. 131



serves to force the valves together against the constant resistance offered by the ligaments. The tendency of the ligaments, we have seen, is always to pull the valves open; and when the animal dies or is feeble, the valves open, and the animal dies with them open; it has no longer strength to keep them shut. This is a strong muscle, and is often found in a state of rigid contraction after death; and although the ligament has still a tendency to force the valves open, yet in a rigid state after death, sometimes this muscle keeps the shells permanently closed. It is by this muscular attachment acting suddenly and powerfully on the valves, that we see the common clams swimming occasionally in the sea, or skipping along the bottom, or leaping with force from a pool of sea water. I have repeatedly seen the pecten swimming to and fro by short sudden efforts in a hand-basin. It swims near the surface, and when it is near to the shallow shore, it tries by this means to escape into deeper water. In a basin it will sometimes cause large quantities of water to be thrown about in sudden jets; and the force with which the valves thus act, causes these animals to move backwards, and even to escape entirely from the vessel in which they are contained. That is not done by the foot, but by the contraction of the adductor muscle of the valves. This adductor muscle is large and single in many of the round forms of conchifera, as the clam, the oyster, the anomia, the placuna, and these are thence called monomyaria. In the *anomia*, the muscle passes through the aperture in the small flat valve, and is attached to a third calcareous plate adhering to some extraneous body. A much greater number, with the valves developed longitudinally, have two adductor muscles, as you see in this *venus* (*Fig.* 131, *a*, *b*); these muscles are placed at a distance from each other, the anterior (*Fig.* 130, *a*) towards the head or mouth of the animal, and the posterior adductor muscle (*Fig.* 130, *b*) towards the anus.

Between these two muscular impressions left by the adductor muscles, you will commonly observe a rough depressed line on the valves towards the ventral margin, which indicates the place of attachment of the muscular fibres, by which the free projecting margins of the mantle are so forcibly retracted into the shell. This marginal muscle (*Fig.* 131, *c*) of the mantle, consists of numerous small fasciculi, extending from this part of the shell, on each valve, and spreading chiefly on the ventral margin of the mantle. By retracting this part of the mantle, they contract the respiratory sac so as to assist in a forced expiration of the contained water, and they protect the most delicate and sensitive part of the mantle from being compressed and injured during the closing of the valves.

The motions of respiration, however, by which the water is brought in through the respiratory orifice of the sac, and expelled through the anal, is not dependent on the action of any of these muscles, for you will observe in the natural respiration of the *conchifera*, as in the *tunicata*, that the parietes of the sac, and the entire body of these animals, remain motionless, while the streams of water are most rapid. The fimbriated margins of the respiratory orifice are covered with minute vibratile cilia, which cause the currents to rush into and distend the respiratory cavity of the mantle. The whole surface of the pectinated branchial laminæ is covered with regularly disposed cilia of a larger size, which are attached to all the minutest rectangular meshes composing these reticulated and pectiniform laminæ. If you cut off a small piece of the gill of the common fresh-water muscle, and place it in fresh water under the microscope, you will at once perceive these cilia in rapid action around the inner margin of every square mesh of the organ. And in the common muscle of the sea, you perceive the same still more obviously, where the cilia are longer and larger, and have a bent clavate form. By these minute organs the currents are directed over the surface of the branchiæ, and outwards through the anal orifice of the sac, as in the tunicated animals.

We frequently observe in the dorsal part of the body, smaller transverse muscular bands passing from the one valve to the other, near the hinge, which assist the larger adductor muscles. The muscular coat of the respiratory sac is often prolonged to a great distance beyond the shell, especially in burrowing species, by which the mantle assumes a tubular form

to reach the surface of the mud, the sand, or the rock, in which it burrows, and terminates in the usual orifices for the entrance and exit of the currents. The muscular fibres are developed to a variable extent over the mantle, and we perceive them extending on to the broad base of the upper and lower lips, for their motions, and indeed all these muscular organs of the conchifera vary in their forms and magnitude, according to the habits and exigencies of the species.

Although the *gasteropoda* are, for the most part, confined to the interior of a hollow undivided calcareous cone, we find these animals in the living state susceptible of a great variety of active motions. Their name is taken from the foot, which, for the most part, extends from the abdominal surface of the body, and sometimes covers that abdominal surface. When it covers the whole abdominal surface of the body, as you see in the doris, those animals constitute the family termed by LAMARCK *gasteropoda*; but when the muscular foot extends only from the lower part of the neck, as you see in the inhabitants of the univalve turbinated shells, then those animals form the group called by LAMARCK *trachelipoda*. But, for the most part, those two very different forms are grouped together under the general name of gasteropoda; for in both the muscular foot is extended along the lower surface of the abdomen, although not attached to the whole of that surface in the trachelipodous animals of LAMARCK.

When you irritate those gasteropods inhabiting univalve turbinated shells, you very soon perceive that they have the power of withdrawing themselves into their shell with great quickness and force. This they do by means of a fleshy strong band, extending backwards from the posterior and inferior part of the neck, and connected with the columella, as you see in the common buccinum (*Fig. Z, b, page* 475, *vol.* 1). This is the muscle of attachment; it is the only part of the muscular system, in these forms of gasteropods, that is fixed to the shell, so that by detaching this powerful muscle of the columella, you can take out the whole body of the gasteropod entire from the shell, without further dissection. If however you attempt to tear out the animal, without dividing this muscle of attachment fixed to the columella, you will tear the animal into two pieces, and leave the posterior half, the liver and testicle, in the male, still occupying the small convolutions of the shell, or the ovary and liver if it be the female. This retractor muscle moves slowly forward along the pillar of the shell during growth, like the adductor muscles of conchifera.

The mantle of the gasteropod is that open, muscular, and secreting fold, the surface of which serves to deposit the successive layers of calcareous matter, particularly its thick glandular anterior margin. This mantle, open in front, is muscular and contractile, as well as of a secreting glandular structure. It can be extended forwards much beyond the margin, and retracted much within the margin of the shell. In this preparation, which I now show you (*Fig. Z, page* 475, *vol.* 1), I have drawn it a little forward from the margin of the shell, so as to bring its thick glandular secreting margin into view.

This muscular mantle covers the respiratory organs, and the terminations of the digestive and generative organs, and secretes and models the new layers of the shell. The muscular fold of the funnel is prolonged from the left side of the margin of the mantle, and by the meeting of its margins is formed into a tube for the passage of the water to the gills on that side. The cavity of the mantle is closed behind, where its muscular fibres unite with those of the very strong fasciculi composing the greater part of the neck. The muscles on the lower part of the neck expand in every direction to form the long muscular foot on which these trachelipodous species creep, and the fibres are prolonged backwards from the same part, to form the strong retractor muscle of the columella. They can swim suspended from the surface of the water, by converting this creeping muscular foot into a concave cup, which moves like a boat along the surface. In the *janthina*, globules of air are enveloped by the assistance of the foot in a glutinous secretion, by which agglutinated globules of air a float is formed sufficiently large to carry the entire animal suspended at the surface of the sea, where its prey abounds. In the *nautica glaucina* the foot and expanded mantle collect the discharged ova between them, and envelop them in an agglutinated plate of sand, which has often been mistaken and described as a zoophyte, from observing the little ova in the flat lamina of agglutinated sand, like the cells of an *eschara* or a *flustra*. The dorsal surface of the foot supports and secretes, layer after layer, the operculum of the shell, whether horny or calcareous.

The upper part of the neck forms a muscular sheath around the complex apparatus of the mouth and proboscis, and supports on the right side the muscular exciting organ of the male; anteriorly it is prolonged to form the lips or margins of he sheath of the proboscis and the two

highly sensitive tentacula which generally support the eyes at the exterior of their base. In many of the naked gasteropods the foot forms a large circular or oval disk covering the whole abdominal surface of the body, as in the *doris*, the *eolis*, the snail, the *aplysia*, and in many of the testaceous gasteropods, as the *patella*, the *chiton*, the *haliotis*. In the floating gasteropods, or those naked species carried along the surface of the sea, adhering to the surface of floating marine plants, the foot, as in this *scyllæa pelagica*, is of a very lengthened and compressed form, and is well adapted, as in the *tritonia* and the *glaucus*, for grasping the slender stems of fuci or of zoophytes.

In the *patella* (*Fig.* 132) the body is covered with a simple conical shell (*Fig.* 132, *h*), open below, and the whole of this

Fig. 132

wide aperture is capable of being covered with the large foot (*Fig.* 132, *a*) on which it creeps. The marginal fibres of the foot (*Fig.* 132, *b*) extend outwards, to be inserted into the lower part of the sides and back of the shell, and the cavity is therefore open before for the protrusion of the head (*Fig.* 132, *e*). The margin of the mantle (*Fig.* 132, *c*), as in bivalves, is retracted by muscular fibres connecting it with the inside of the shell. The branchiæ (*Fig.* 132, *d*) are here exposed between the margin of the mantle and the foot, in the most exposed situation, when the animal slightly raises its shell from the contact of the rock. The tentacula (*Fig.* 132, *f*) have here a peduncle at their base for the support of the eyes. The mouth (*Fig.* 132, *g*), as in most of the vegetable-eating gasteropods, is destitute of a proboscis, and is here provided with a very long convoluted tongue, covered on its upper surface with several rows of sharp, recurved, horny teeth, for filing the marine plants on which it feeds. The upper tentacula of the doris are withdrawn into sheaths on the exterior of the mantle, and muscular fibres embrace the orifice of the branchial sac in that animal, so as to contract it like a sphincter. The eyes of the gasteropods are sometimes placed at the extremities of peduncles of greater length than the tentacula themselves, as you observe in the snail, where they are placed at the extremities of two long tubular muscular organs. The eye-ball in the snail is placed at the extremity of a muscular sheath, the fibres of which are chiefly disposed in two directions. Muscular bands, of a longitudinal direction, are attached to the sclerotic, the action of which is, consequently, to withdraw the eyeball within this tubular peduncle. But we observe very distinctly circular fibres also surrounding the whole of this tubular structure. Those circular fibres which surround this organ of the snail serve both for the extension and the retraction of the eyeball; for you will observe that when the eyeball is partly retracted, the integument then embracing it is doubled at the extremity. It is drawn backwards chiefly by these longitudinal filaments. But when it is thus drawn within a part of the extremity of the sheath, then the circular fibres come to act upon its anterior part, so that by their action it is pushed backwards, at the same time enclosed completely within the organ, and the organ itself is closed as by a sphincter, when at length we see no trace of it upon the head of the snail.

Extending from the mouth, in the greater number of the predaceous gasteropods, you perceive a long proboscis, an organ of great muscular strength, and provided at the extremity for the most part with sharp, hard, recurved hooks, as you observe in the proboscis of the buccinum (*Fig.* 133). This is a powerful

Fig. 133

organ for the destruction of other molluscous or soft animals, upon which these species feed. The proboscis is a strong muscular tubular organ contained in the neck, and capable of being protruded from the mouth by the numerous powerful muscles inserted into it. It contains a cylindrical fleshy tongue, which supports the sharp teeth or spines on its two expanded terminal lips (*Fig.* 133, *a*). These two lips to which the teeth are fixed, are supported internally by two long cartilaginous laminæ, very strong in this carnivorous species. The tongue, with its teeth, is capable of being protruded beyond the extremity of the extended proboscis which contains it. It is retracted by longitudinal muscles (*Fig.* 133) inserted into the middle of its external surface, and it is forcibly protruded from the proboscis by two lateral oblique muscles (*Fig.* 133, *d d*) attached to the sides. This organ is employed by those carnivorous gasteropods to destroy living prey, or to tear the flesh of the animals just destroyed.

This is a structure which is very different from that which you see in the gasteropods that feed on vegetable substances, for in them you will sometimes see jaws for compressing the vegetable food; and at other times a long tongue, as in the common limpet, covered with rough spines for filing the plants. These creeping slow gasteropodous animals are capable also of swimming, which they do chiefly by the action of the foot. We observe them often creeping upwards along the sides of a basin of water till they reach the upper margin, upon reaching the margin of the water they pass the foot backwards along the surface of the water, and making it concave at its upper part they displace a large quantity of water, forming with the foot as it were a little barge; they can then swim across the surface of the water, hanging the shell and all the posterior part of the body below the surface of the water, by simply suspending themselves from the little hollow boat they have made by thus rendering the surface of the foot concave, and displacing part of the water, and, as in the case of the floating conchifera, a little water thrown on the hollow exposed foot causes them to sink. When we observe them creeping on a smooth plate of glass, by looking through the glass there appear to be waves advancing over the whole flat surface of the adhering foot. There are transverse lines of the foot which advance, and other transverse portions which are fixed points, so that by thus fixing parts and advancing those immediately behind, the whole motion of the foot is like the creeping of a serpent on the rough ground. Their rapid motions when developing in the ovum and for some time after they escape from it, are produced by the vibrations of circles of cilia disposed on the anterior part of the mantle, very much resembling those of rotifera, and those vibratile cilia I have found in the young both of the naked and the testaceous gasteropods. From mistaking the true nature of the foot of the *carinaria* and some other gasteropods, an order of *heteropods* was formerly established by Lamarck, which was supposed to consist of animals higher than all other invertebrata, and to form an intermediate form between the cephalopods and fishes.

Unlike the slow-moving creeping gasteropods the class of *pteropods* have fin-like muscular expansions to enable them to swim freely through the ocean. The muscular covering of the viscera called the mantle is here closed, so that their abdominal cavity is a shut sac. Organized to swim near the still surface of the sea, they have no muscular foot to creep upon; they have generally two muscular membranes extending one from each side of the head or anterior part of the trunk, by which they swim. These two muscular folds, by the motions of which those pteropods, as the *clio australis* (*Fig.* 134) and

Fig. 134.

others, are enabled to swim to and fro in the water, have no rays to support them. On the surface of those expanded members you can generally perceive a striated appearance. This striated appearance is produced by the laminæ of the gills or the branchiæ, so that those fin-like organs of motion serve both for the purpose of carrying the pteropod through the water, and of aerating the blood. It is from the structure of this muscular part that those pteropods have received their name; and you will find that whatever be their form,

there are those muscular organs, like wings, to enable these minute, gregarious, soft, and transparent animals by their motions to swim to and fro in the sea. They are of a form generally more nearly approaching to that of the cephalopods, especially to the inferior testaceous cephalopods, as we see in the *clio australis* (*Fig.* 134). The head of that animal is terminated anteriorly with tubular muscular sheaths embracing the tentacula (*Fig.* 134, *c*). The muscular organs of progressive motion covered with the laminated gills (*Fig.* 134, *a*), extend to a considerable distance from the sides of the neck. The muscular covering of the trunk, which is open in front in the cephalopods and in the pectinibranchiate gasteropods, is here closed (*Fig.* 134, *b*), so that the gills are necessarily placed on an external part of the body.

The *cephalopods* can swim through the sea or creep along the bottom. The eight feet around the head arise from a muscular continuous ring which extends round the mouth; that muscular disk—which you observe also in the fishes that come nearest to the cephalopods, as the lampreys—and those eight muscular arms disposed around the head, have a very complex structure. The outer disk is only divided into eight of these members in all the naked cephalopods. There are none of them that are truly decapods, they are all octopods; but yet you will observe there is a great difference among those naked cephalopods, arising from the development of two other long cylindrical organs, which are frequently considered as an additional pair of feet; thence the calling them decapods. But these two additional organs are of a nature very different from those which are produced upon the exterior disk. Those two tentacula, as they are called, are long and cylindrical to near their extremity, where they are generally flattened, strong, and muscular, and where they have, upon one of their sides, at the distal extremity, a number of small suckers.

The eight arms or feet are developed from the exterior around the head, and from this structure and the use of those organs these animals have got the name of *cephalopods*. The feet are very strong muscular organs, formed of diverging fasciculi, which rise up from the cartilaginous disk at their base. From their internal surface, employed in grasping, we observe the numerous small circular concave organs, the suckers, developed. Those suckers have also a complex structure, provided internally with a cartilaginous ring, and externally with numerous diverging muscles with a thick muscular margin. They act like a sucker in adhering firmly to the object they design either to seize for prey or to creep upon. So that by those organs they can creep up perpendicular places even when out of the water. The long tentacula, which arise lower and are developed from without the brachial disk, are also strong muscular prehensile organs; they are organs by which these animals can fix themselves to a part, and move around that fixed point to a considerable distance. The tentacula are thus a sort of anchor to them. At the base of those arms you will observe in the *octopus* that there is a strong muscular membrane passing across from the one arm to the other, all round the head. This strong muscular membrane, connecting the bases of these arms together, is an organ by which the octopods are enabled to swim with some rapidity through the sea, but only backwards. To perform this motion it expands suddenly those arms around its head, and strikes the water from its head, pushing, consequently, its round posterior part backwards,—this form of cephalopod being able only to swim backwards, from the total want of fins. It is not provided with organs in the shape of fins, disposed on any part of its mantle, as in most other naked species. That is the reason apparently why the octopod has that inter-brachial membrane so largely developed, compared with what we observe in the *sepia*, the *loligo*, or even the *sepiola*. The arms of the *octopus* are also large compared with those of the other naked cephalopods, and they are approached in size by those of the *sepiola*. But you will perceive that they are all truly octopods, so far as the number of arms are concerned, which originate from the subdivision of the oral fleshy disk.

We observe in most of those naked cephalopods, that the exterior of the mantle gives attachment to fin-like organs which are variously formed and situated. In the *sepia* those fin-like organs of locomotion extend from the upper margin of the mantle, along the whole of the sides, to the lower part of the body. By those muscular organs the sepia is enabled to swim either forwards or backwards; they move by levator and depressor muscles, like the fins of a fish, extending from the sides of the mantle; but no cephalopod has the organs of progressive motion supported by osseous or cartilaginous rays of any kind; no rays have been found supporting the muscular fins of any pteropods or cephalopods. In some of the loligines we also observe that those lateral fin-like organs are considerably developed from the sides of the mantle; that they extend almost to its upper margin, and completely reach and meet at the lower

part of the body in the *loligo vulgaris*. In the *loligo sagilatta*, the arrow-like form of the posterior part of the body is produced by these two extended caudal fins, but in the *loligo vulgaris* you observe they commence high up, become wider and wider to their middle, and then contract to the base of the body; those of the *loligo sagilatta* shoot out in an arrow-like manner from the sides of the pointed tail. In the *loligopsis* you observe that those two fins form an almost circular disk at the posterior part of the body. Where they have this extended form, as in the *loligopsis*, the *loligo*, and most of the naked genera, the animals can swim with almost equal facility either forwards or backwards.

In the little *sepiola* we observe those two rounded lateral fins placed pretty far forwards upon the mantle (*Fig.* K*, 1, *b c*, *p.* 513, *vol.* I), supported by a cartilaginous, firm, internal lamina, which I mentioned before as analogous, somewhat, in position and nature to a scapula. They are united by strong diverging muscular fasciculi, which connect them before and behind to the exterior surface of the mantle; and by those muscles they are enabled to move these two fins, like the pectoral fins of a fish, or like the wings of a bird. The mantle itself is a strong muscular organ, composed almost entirely of muscular fibres, supported by thin cartilaginous laminæ, situate in different positions on the back and along the sides, to give it additional strength. On the exterior surface of the mantle, the disposition of the muscular fibres is chiefly longitudinal. If you cut open the mantle, and look at it on the inner surface, the disposition of the muscular fibres is seen to be chiefly transverse. But besides this general disposition, we find fibres crossing each other in every direction. Although this is the general disposition of the outer and the inner layers of muscles, we perceive that, extending downwards from the fore part on each side, there are strong muscular bands which connect the base of the funnel with the anterior part of the mantle; those enable the funnel to be withdrawn, and the mantle to be contracted towards and over the funnel. The muscles are long and powerful which connect the head behind to the back part of the trunk.

The motion of respiration is effected by the expansion of the lateral parts of the mantle, to allow the water to rush in immediately over the two internal branchiæ, for the branchiæ are always disposed symmetrically, and attached by ligamentous bands on the two sides of the body, immediately within the open mantle, and extending downwards from those two lateral parts to the two portions of the auricle called the lateral or branchial hearts. When the water has thus passed downwards over the branchiæ, the currents meet and pass upwards over the abdominal viscera, over the extremity of the rectum, and of the two oviducts in the female, and over the termination of the male organ on the left side of the body of the male, and also over the termination of the duct of the ink-gland which opens into the rectum, so that the act of expiring the inhaled water assists in the discharge of all the natural evacuations, as we saw to be the case in the *tunicata*, the *conchifera*, and the gasteropods. There are also strong muscular aponeuroses spread over the several viscera, within the abdominal cavity, to assist their several functions, and retain their proper positions.

In the nautilus there are lateral muscles of attachment to fix the base of the animal to the shell, and palmated arms to assist its swimming, and tubular tentacula, like the pteropods and many of the naked gasteropods. The animal found in the argonaut shell is an octopod, with membranous expansions (*Fig* 135, *a*) on two of

Fig. 135

its arms, to assist its motion on the surface, and the other three pairs of arms (*Fig.* 135, *b c d*) are thought to assist by rowing its barge along the surface. This is the animal which was said to have taught man the use of sails in navigation. So that we perceive that the muscular system of the molluscous classes varies more than in the articulata, and that that of the cephalopods fits them for more numerous and varied movements and actions than in all the inferior invertebrata.

ANATOMY AND PHYSIOLOGY.

LECTURES

ILLUSTRATED BY THE

HUNTERIAN PREPARATIONS

IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS, LONDON.

Delivered at the College in 1833, *by*

SIR CHARLES BELL, K.G.H., F.R.S.

LECTURE VIII.

ELASTICITY OF LIVING PARTS.

You know, Gentlemen, that we have endeavoured to be directed hitherto by the arrangement of Mr. Hunter. Now will you permit me to read a passage from the catalogue, which is in the words of Mr. Hunter. "We find," he says, "a common principle in the animal economy; that every part increases in the same degree, according to the action required. First, we find that muscle increases in size in proportion as we require strength; vessels become larger in proportion to the necessity for supply, as, for instance, in the gravid uterus. The external carotids in the stag also, when his horns are growing, are much larger than at any other time; and I have observed," he adds, "that in inflammation the vessels become larger; more blood passes, and there appears to be more action taking place. But the nerves do not seem to undergo any change; the nerves of the gravid uterus are the same as when it is in a natural state, and neither do the branches of the 5th or 7th pair of nerves in the stag become larger." The first part of this passage, we shall find it necessary to keep in view, in order to give any sort of interest to the subject of this lecture, and the passage puts me in mind of a duty I have to perform.

I have received letters, as formerly I was wont to do when a lecturer, without names; and it is my habit, when I see the subject, to turn my eye to the bottom of the page, and if I find no name I do not read them. Although a Frenchman might suppose that the contents of such a letter was all praise, yet, according to my nature, I rather presume that there is some great severity of criticism, and as I know full well, that in order to prepare oneself for the task before you, it is better to be without such criticism, I do not read these letters, and I hope I shall stand excused for the neglect. But I have one requesting me to say, whether the nerve or the bone is formed first. Now the question is put with such a degree of ingenuity that I really cannot answer it. The subject is fairly open to investigation; but it cannot be investigated in such a disquisition as a lecture, nor by conversation, but only by experiment and accurate observation.

The subject I have now to discuss is one which, on account of its great difficulty, I wish I could avoid, viz., the nature of elastic power; and Mr. Hunter has put down in the series a certain set of preparations which are illustrative of elasticity, as it belongs to nature and to the animal body.

Now we find that his definition is, that perfect elasticity of the body, is that power which is capable of restoring the form of a part which is thrown out of its normal condition by enlargement or by pressure. The best example of elasticity, however, is presented by the atmosphere, which is, indeed, the only body, if I may so say, that is perfectly elastic. You may press it to any degree, you may press it for any length of time, and it will resume its former magnitude. The blade of a saw gives us the best example of elasticity in solid matter. Let me, however, take an example from an ivory ball, which comes near to our subject. Suppose there is a slab of marble covered with black paint, and that you lay down an ivory ball upon it. When you raise the ball there is a black spot on it. Take the ball again, and let it fall from a height, and the spot of black is larger. Increase the height, and so increase the velocity as it descends, and the spot is still increased in magnitude. This proves that when there is percussion, there is a change in the form of the ivory ball throughout its whole circumference. This brings us at once to the point, Gentlemen. We are willing to suppose that in the loose texture of bone there must be an elasticity which you cannot conceive to exist in the firm texture of the ivory teeth; but if there be an elasticity in the ivory teeth, of course there must also be elasticity in the structure of bone, which rather confirms our view that the thickness of bone, as well as the elasticity of the skeleton, is apportioned in the different parts of the skeleton, according to the function that each part has to perform.

Now elasticity is always opposed to, or contrasted with, muscularity, for muscularity is a property of the living fibre of the body, whereas elasticity belongs equally to living and to dead matter. The elasticity and muscularity of a part continue during life, but with the cessa-

tion of life the irritability of the muscle ceases, while the elasticity of the fibre remains. This fact gives rise to some of the most interesting and important of Mr. HUNTER's experiments. But, let us see, acknowledging all this to be true, whether there be not some property in a living fibre which sustains that elasticity. Take an example from a harp-string. When touched by the delicate finger of a lady, it gives out a certain note; if it be struck a hundred times by it, it will give out the same note; but if a ruder hand be applied to it, it becomes out of tune, it no longer gives the same note, it is permanently stretched, it has parted with some of its elasticity, and by losing some of that, it has lost the power of vibrating in due time; it requires to be screwed up by one who has a delicate hand and a perfect ear, straining it to such a degree that it will vibrate in time, and give out a perfect note. Thus, you see, that in a part which is dead, and yet is in perfect possession of elasticity, there is a point of perfection in that elasticity. In the fibre of a living body there is elasticity in every cord, fibre, tendon, and ligament. When these cords are over pulled, the tendons may be strained, but though there is no hand to screw them up, yet they *are* screwed up, and are brought again to a proper degree of tension. Take, in the same way, a piece of steel, and put it into the fire; it is there brought to a certain heat, and on being then plunged into cold water, it becomes possessed of great brittleness. It is brought once more to 500° of Fahrenheit, and is then adapted for the spring of a watch, having a high degree of elasticity. Still, if it be drawn too forcibly, too violently, and become acutely bent, it remains bent, for it has lost its elasticity.

Now the body is the subject of all these phenomena in violent exercise, yet every part is put right again afterwards, and as no such process as that which I have described as taking place in the harp string occurs, I cannot but maintain that a property belongs to the body of the animal, by which every part is supported in a due degree of elasticity, and that if by straining it has lost some of its elasticity, yet in process of time, indeed in a short time, by the stimulus of the action which I have suggested, it is restored. This observation, however, does not require me to contradict the assertion that muscular fibre possesses elasticity, and that elasticity is a property belonging to life and to inanimate matter.

We have now to examine the preparations before us, and the first thing that is here pointed out to us relates to the cellular texture. You are aware that every living body consists very much of cellular texture, which pervades every substance, every organ, is situated intermediately betwixt every part, and that it is the cellular texture which gives that degree of firmness and elasticity which your frames possess. You press the skin, and it is depressed, but it immediately returns to its former condition. So in all the motions of the joints, there is a fine elasticity which readjusts the skeleton. The cellular texture, then, gives a firmness and capacity of motion, or of being moulded, and a due degree of resistance or elasticity to every part of the body. We find it admirably suited to its purpose. Although you may be brought more particularly to admire the structure of a joint, such as the knee-joint, yet the minuteness of the object is lost as a point of admiration, and were you to take the viscera, and observe any one of the cells there to be found, you would have as much to admire in that little cell as in any of the large joints of the body. You will notice in the ligamentous attachments certain delicate fibres, and it makes no difference whether we view these in the membrane of the eye, or in the knee-joint; for in the minuteness characteristic of the former, they are as nicely apportioned to keep each part in its due place as they are to keep the grosser parts of the body in due apposition, and to permit them to move.

You will observe, that without this cellular texture there would be no motion of the muscles or of the tendons. The muscle could not contract, and the sheath of the tendon could not play; the artery itself could not beat, and there would be no motion, or volition, from place to place. Mr. HUNTER, pursuing this subject, has deposited here some parts of the larger animals,—for example, of the elephant—wherein he shows that as in man the great support of the viscera is afforded by the abdominal muscles, so in these large animals with a pendulous belly there is a strong elastic texture for the same purpose. Pursuing this subject, then, we come to the joint itself. The first thing we must notice in that is the formation of the bone, and we ask ourselves—Why is this enlargement of the bone in the joint? The first thing that it is important to observe here is, that the mechanical friction is not at all increased by the extension of the surfaces which are in contact, or the surfaces which play upon each other. Suppose we take a log of good timber to make an experiment illustrative of this subject. Let it be four feet broad and four inches thick. Draw it across a trench, and append a weight to it. Now, if you place the piece of wood on its flat

side, the weight will carry it down. If you place it on its edge, the weight will still carry it down. There is no difference in the weight bearing on it, and therefore there is no difference in the impression made by the weight, for in the case of the broader surface the square inches support each square inch, and in the other, where there is a smaller extent of surface in contact with the trench, there is a greater weight resting on each square inch of the edge. By enlarging the surfaces which are in contact with a joint, security is given to the joint, without in any manner diminishing the freedom of its action by an increase of friction. In the head of a bone this principle is taken advantage of for the purpose of increasing the security of the joint. You must be aware that the tendons or ligaments run from certain points of the bone which do not extend, and no difference arises from the distance of those points from each other. There the ligaments are attached, and being thus attached by the sides of these processes of the bones, they are removed from the seat of motion, and have a commensurate power. In the same way, when tendon runs over the head of a bone, as the head of the bone is enlarged, so is the power of the muscle and the tendon enlarged; and, indeed, Mr. HUNTER shows that by means of the interposition of one tendon under another, the power of the superficial tendon is increased, because it is removed from the centre of the joint.

Well, then, looking at the head of the bone in this light, we must next admire the cartilage, and here we are indebted to Mr. HUNTER, though, to the elder brother, for explaining the nature of the cartilage which tops the bone, and its advantage as an interposition of an elastic body to take off the jerk which would arise from the bones coming in contact. The cartilage which tops the bone, and enters into the composition of the joint, is quite different from the cartilage which you see in the larynx or trachea. Mr. HUNTER has shown, by proper maceration, and surveying it by the microscope, that the former consists of a series of fibres standing perpendicularly to the articulating surface. I cannot better describe it than by saying, that the minute texture of the cartilage which tops the thigh-bone, and which tops the end of the tibia, is introduced for the purpose of producing a fine smooth surface for motion, and that it possesses a certain elasticity, in order to prevent the jar which would arise from bony contact.

The next thing that we observe is the synovial membrane. The delicate texture of the joint is cut off, as it were, from all the surrounding parts by this delicate membrane. It gives no degree of strength to the joint, but is a protection to it, and is especially remarkable for its secretion of synovia, which is the finest fluid that can be conceived for lubricating the joint. The surgeon knows full well the effect of any diminution of this secretion. He knows that a jar in the joint will form water or dropsy in the cavity, and he is in danger of being deceived in his diagnosis, if there be slight inflammation of it as from a blow, because then the lubricating fluid is changed in its chemical composition; it is then no longer fitted to lubricate the part, and the joint jars when moved, and creaks, giving the sensation of a broken bone. The surgeon is frequently deceived, believing that a bone is broken, when there is only a jar from the contact of the cartilages, which arises from the want of their natural lubricating fluid.

The next thing to be considered in a joint is the bursæ mucosæ. These are well described as friction wheels, and are interposed to prevent severity of pressure or friction. We can easily conceive that a certain degree of friction will arise from the movements of the end of the femur, but if a few loose cartilages be introduced there, you will have four surfaces instead of two for action, and there is then a division as it were of the attrition, and a saving of friction on the end of the bone. But there is a finer thing here still. When I present to you a femur, you perceive that its end does not exhibit a portion of a circle. How then does it happen that the head of the tibia corresponds with the femur in every position of the joint? It would do so if there existed the uniform part of a circle. Since that is not the case, we have here, apparently, a mystery. But the semilunar cartilages of the joints are interposed that they may shift and accommodate themselves to the different surfaces, permitting the higher degree of convexity of the femur to lie upon the tibia with perfect accuracy in the position of flexion, and allowing all the surfaces to be perfectly supported, and in contact, during extension of the limb, so that the interposed cartilages answer a double purpose, first, as a kind of friction wheels beneath the great weight of the body, and as parts which accommodate themselves to the surfaces, according to the different degrees of flexion.

Having thus admired the beautiful structure of the joint, which is, indeed, universally admirable, for every one who has been at all initiated into the subject has been struck with the perfection of the

part and its beautiful adaptation, I must again recur to the aphorism, if I may so call it, of Mr. HUNTER, that motion of a part is necessary to its perfection; for unless the joint be moved it degenerates, and, generally, very rapidly. If a joint, for example, should be anchylosed, that is, if the parts should be united by bone, and not moved at all, then there is the absence of that very principle which is necessary to keep the part in perfection,—the motion necessary in living matter. In this case the most extraordinary phenomena are presented to you. The cartilage so good, the synovial membrane so beautiful in texture, so important in secretion, is inclined to change, and becomes like cellular texture. The ligament which is so dense and strong, becomes soft, like common cellular tissue; and even the tendon, which seems so beautiful in a perfect state, degenerates into cellular texture, the muscle itself also becoming like cellular texture, but having neither its vascularity nor its fibrous character. This process goes on until all the parts get out of use, and from a want of that, from the want of its natural stimulus, the joint is completely degenerated. But we may have the very converse of this, or nearly so,—not so perfect but approaching to it,—when a bone is broken, for example, the thigh-bone, and is negligently treated, ossification not taking place at the end of the bone. Cartilage is formed around the end of the bone; there arises a ligament like the synovial ligament around it, and within it secretes a fluid which you cannot distinguish from synovia, so that there will be a motion of the broken bone. You find the parts presenting characters somewhat like a natural joint, but on comparing them with the actual natural joint, you find them altogether different. This is another instance of the life of a part exercising its power under all adaptations and provisions; and there is nothing more important to a surgeon than this very point of consideration. He treats an inflamed joint. For a certain time his purpose is to diminish the inflammation, for if he permit it to get too high, the joint becomes destroyed; but the time comes when, if he persist in evacuations and the means of diminishing the action of the part, keeping it still, without motion, it degenerates from another cause. There is nothing more necessary to the practitioner than a knowledge as to when he should apply the one principle of treatment, and when the next.

There is in this department a variety of preparations, placed by Mr. HUNTER, which, however, if we were to attend to as they deserve, would carry us directly back again to a subject on which I have already lectured. To-morrow we will advert to the articulation of the joints, when I shall have occasion to refer to the round tendon of the hip-joint in man, which implies the great freedom that belongs to the lower extremities. Mr. HUNTER has also placed here several preparations illustrating the freedom of motion which belongs to the hand, and I shall proceed on the principle that, if Mr. HUNTER has dissected a part and placed it here, it is our duty to consider what he had in his mind by so doing. He has dissected the shoulder-joint of a frog, in which there is a material round ligament, and which seems to imply that the anterior extremity of a frog is not for grasping, nor for such offices as are performed by that extremity in quadrupeds, but merely for swimming. But to pursue our proper subject, the elasticity of a part, I must beg your attention now to the foot. There is really nothing more beautiful than the structure of the foot, and I do not know any demonstration which would lead a well-educated person to desire to know more of anatomy than that of the foot. The foot has in its structure all the fine appliances that you see in a building. In the first place there is an arch every way that you regard the foot. Looking down upon the foot, you see several bones coming round from the astragalus, and you find that the entire circle of surfaces is in contact. Looking again at the profile of the foot, you see there an arch. The ball of the toe is the anterior part of the arch, and the heel is the posterior. If we select the front, we find in that direction a transverse arch, so that instead of standing as you imagine upon solid bone, you stand upon an arch, composed of a series of bones which are united by the most curious provisions for the elasticity of the foot. You must have felt sometimes on coming down directly upon the heel what a shock is given to the head, whereas when you come down on the ball of the toe, an elasticity is found in the whole foot, and the weight at last coming on the whole sole of the foot, you stand or walk on an arch. I would say, indeed, that the foot is as finely provided as the foundations of Eddystone itself, which is the perfection of workmanship. In every position that you observe the light-house it presents the curve of an arch, one stone being joined in with and rivetted to another. It is precisely the same in the human foot.

Passing from joint to joint, let me beg your attention to the increased degree of elasticity which you have in the spine. Really there is a want of preparations here on this subject, which is strange for

a place so rich in other respects, and, therefore, I have been obliged to ask a young friend to make me a sketch for your notice. The first thing that we notice in the spine is, that it does not stand upright. If it did, one bone would be built on another, like a pillar, and it would possess no elasticity. If you were to take a piece of elastic steel, a spring, which had no bend in it one way or the other, it would experience a certain shock before it gave way; but if it were already bent, then it would give way on the slightest impulse, and its elasticity be greatly increased. The main object of the spine is to sustain the head, and if you consider how the brain is hurt by every agitation, or every vibration that goes through it, you will be aware of the great beauty which distinguishes this curve of the spine. The elastic spring is already bent, it yields on the slightest motion of the body, and thus saves the head from a shock.

Thus much with regard to the whole form of the spine; but you have also to remember the particular structure of each vertebral substance. There is a fine spring here, curiously provided, so that the whole shall have a common degree of resistance. There are cartilages intervening, possessing a high degree of elasticity, and which, therefore, give a very remarkable degree of elasticity to the whole column. There are some examples here which I have made from fishes. You see here that the elastic material is greatly increased; that it is stronger at the anterior than the posterior part. But the fish is buoyant and supported; it has not its weight to bear on the column, and while the elasticity is greatly increased, the strength of the whole column is not weakened. But there is also a fluid between each vertebra, and what can better ensure a perfect facility of motion than the resting of one joint against another where a fluid intervenes? If you conceive a round ligament passing from one vertebra to another, and containing this fluid, you will have a notion of the elasticity of the living spine in the fish. But this elasticity in the fish is not for the purpose that I mentioned in the human body, but to aid the muscles. When the fish is about to leap out of the water, or is passing rapidly through it, the muscles on one side of the body are employed to bend the spine, which then becomes a powerful spring, and this, aided again by the muscles of the other side, causes it to be propelled with great force. It is surprising to see the salmon move along, how it curls itself about, bringing its extremities almost to meet. This structure of the spine, aided by the muscles, also enables it to leap high out of the water, so as to pass over cataracts of very considerable depth. When an animal, like the deer, is in full career, but is about to stop, it does not do so abruptly, but, as it were, on a spring; and when the race-horse has run over the course and is about to be pulled up, he is not checked abruptly, but on the spring. There is a due proportion between the elasticity of the body and the muscular power. But as age advances, there seems not merely a disposition to inactivity coming over us, but an incapacity to move. The two correspond; for no doubt if the muscular power and the disposition to exercise were to continue unabated, you would find a want of elasticity to correspond, in consequence of which there would be danger of injury to the parts, or of death, if exercised. In youth there are strong spirits and muscular power, and as we advance in life there is both less disposition and less capacity for motion.

The next circumstance to be noticed with regard to elasticity, applies to muscularity. Mr. Hunter has put down as examples of this the bivalve shells, in which, as in the oyster, for example, the two parts separate by an elastic power in the joint. That elasticity consists rather in the power of resisting pressure, than of elevation. It is in the anterior part of the joint that this property resides; and I cannot but admire, as others have done, that the whole of the intervening part behind is closed up by soft matter; for if it were not closed up, small portions of sand would get in there and suffocate the animal, because the elasticity of the joint is the means by which it is enabled to breathe. The elastic power of this articulation opens the shell, and draws the water into the animal's lungs, so that, in fact, it is not merely for opening the shell for other purposes, but an organ of respiration, whereas in closing the shell a muscular power is exerted. What is termed the *beard*, originates in the lower shell, and being inserted into the upper one closes the shell, and thus elasticity and muscularity are at variance, or, rather, there is a combination of influence for opening and closing the shell. I say this is the mode of respiration, and it reminds me that it is not only in animals thus low in the scale that we have this phenomenon, but in man also. At the anterior part of the body there is a very fine elastic cartilage, and the cartilaginous texture which unites the ribs to the sternum is often the means of sustaining life. It keeps the thorax in such a mediate condition, that the muscles of expiration may be enabled to act against the elasticity, so as to expel the air, and in order, also,

that the muscles of inspiration may act against it so as to draw in the air. It is useful, therefore, in keeping the ribs in a mediate condition. I shall presently have an opportunity of stating, perhaps with more interest than I can do it now, that the nerves and muscles exert more power in the act of inspiration than of expiration, and that the muscles of inspiration, are aided, if I may use the word, although they are, in fact, also opposed, by the elasticity of the cartilage; for it is the elasticity of the cartilage that is the counterpart of the action,—and the elasticity of the cartilage retains life where otherwise it would be lost from a want of respiration. In short we see, as Mr. HUNTER has particularly noticed, in the lower animals, as we do in the higher, that the elastic property aids the muscles to sustain one of the most important functions of life.

The next example I shall adduce is one not, I hope, without interest. I allude to the elasticity and muscularity observable in the trachea. I know that I speak to those who remember well that the human trachea consists of arches of cartilage, which have a high degree of elasticity. Now we find that the arch of the cartilage is not complete. It forms somewhat more than about two-thirds of a circle, and the usual explanation given of that is, that the morsel of food may pass down to the œsophagus, distending the œsophagus, the membranous posterior part of the trachea corresponding with the dilatation of the œsophagus and gullet. But there is another explanation. It is a great evil to be satisfied with ascertaining one use of a part. There is nothing more true than that a part of the animal body,—different from the contrivances of man,—instead of performing one use, often performs many. The best instance of this is, that which is afforded by the process of respiration. Only consider how many functions are performed in the act of breathing. Well, then, the trachea is provided, undoubtedly, to permit the morsel to pass easily down the pharynx and œsophagus. If you take the trachea, for example, of the horse, and try to dissect out a portion of it, you find it held fast by the posterior part, and when you cut through the posterior part, it is loose, it expands. Looking to the posterior part more narrowly, you find that it consists of distinct muscular transverse fibre. You have not much opportunity of seeing this accurately in the human body, but upon dissection you observe some fibres, so that upon the extremity of the arch of cartilage in the windpipe, there is a transverse set of fibres. Here, then, the elasticity of the cartilage and its tendency to expand, is put in opposition to the contraction of the posterior fibres of the same tube. And for what purpose? I believe for an obvious one,—as a sort of expanding power, to throw off the sputa which could not otherwise be ejected in man. You know that there is a secretion poured out by the mucous membrane which requires to be discharged? There can be no action which can correspond with that of a pump: it cannot be drawn out. But by the contrivance alluded to, it is thrown up. The effect is produced by this simple means,—when you inspire, the tube is expanded, and when you expire the tube is contracted, so that fluid lodging upon the tube, and receiving a slight impulse from the air drawn into the lungs, has a powerful effect produced upon it by the air transmitted out of the lungs, because as air passes with little force through a large tube, as in inspiration, and with great force through a narrower tube, so the sputa or mucus is rejected upwards by the narrowing of the tube in expiration, which is materially increased by the effort to expectorate.

But let us take the trachea of birds. One might say, on looking at the trachea of a bird, that it is very different in its texture from that we have just considered, for it is a complete circle, and therefore can undergo no such change in form as I have supposed. You argue, accordingly, that in this prolonged air-tube, no secretion will be found, no part of it foul or loaded in the same manner as the trachea in man, or any of the quadrupeds. As, therefore, it is made of such a form that it is not likely to eject sputa, it is similar to any other tube in which there is a proportionate degree of secretion and absorption. This has always appeared to me as a confirmation of the notion I have endeavoured to impress on you, relative to the cause of the tube in quadrupeds being partly cartilaginous and partly muscular. At all events the muscular contraction and the elasticity combine together in those animals, and antagonize each other to produce a certain effect.

Among these preparations, Mr. HUNTER has placed one which carries us at once to by far the most important subject of all. In the series of elastic parts he has placed the aorta, and it becomes our duty to understand why it is here arranged. The subject leads us to reflect on the work of Mr. HUNTER, in which he so admirably explains the nature, quality, and effect, of the elasticity of this part. In order to understand his views, we must once more revert to some principles in mechanics or hydraulics. If one ball strike another, the ball first put in motion im-

parts its force to the other, and is exhausted; but if a second impulse be given to the ball when in motion, the whole impulse is bestowed in *accelerating* its motion. In short, the stationary power of the ball is already overcome, and the whole additional force is directed to the continuance of its motion. In the same way, if fluid be moving in a tube, if, for example, a workman be pumping, a certain process of distention is required to give motion to the fluid in the tube at all; a strong impulse is necessary to move the column of water at first, and if time be lost before the second impulse is given by the forcing pump, a great deal of the force will be lost, because the water has become once more stationary, and force is expended in again getting the water into the condition of motion. The workman, therefore, finding this, contrives two tubes, so that the one shall act simultaneously with, or immediately after, the other, in order that the upward motion of the column of water may never stop. Hence the second, third, fourth, fifth impulse, is not exhausted in overcoming the first inertia of the water, but in propelling or accelerating the motion already begun. Presently, however, he finds that two tubes do not answer so admirably as he could wish, and he considers it necessary to make a third, to occupy the interval which occurs between the action of the first and second. But at last he brings another contrivance in aid instead of this. Suppose he has to force up the water, as in the case of a fire-engine. Two tubes convey the water into a reservoir; over the water there is air, which is perfectly elastic, and as the water is forced up against the air the air is compressed. The tube, through which the water has to pass out upon the burning house, has its mouth under the water that is compressed by the air, and thus the pipes of the forcing pumps on each side will have no interval with regard to their effect, because of the elastic atmosphere that fills up the interval. Here then we have an illustration of the beautiful effect of the elasticity of the aorta, and all the arteries of the body. There are two varieties of action here; there is the power of the heart, and the muscular power of the arteries. If when the heart propelled the blood onwards there was a pause, if the blood in the vessels actually stopped, the whole of the second impulse of the heart would be exhausted in destroying the *vis a tergo*, the disposition of the fluid to remain passive, so that it could not overcome the inertia, and its power would be lost to the circulation. But in order that the heart should have its full power developed in the circulation of the blood, it is provided that there should be one impulse of the heart, and one of the artery. But there is a third power waiting to join these perfectly together. This is an elastic power, which facilitates the circulation in a remarkable manner. You perceive how one could dwell on this subject, and illustrate it by various hydraulic instruments in which the same principles are put in action for the motion of fluid.

But there is another quality of elasticity here, and the best way of showing it is, to let you see what takes place when the coat of the artery has lost its elasticity and cannot sustain the action of the heart. Although the coats of an artery in this condition acquire a remarkable degree of firmness, it is an inert firmness, and not that yielding and resisting which is the character of elasticity. When the coat of the artery comes to lie, for example, against the breast bone, the sternum, you would suppose surely that the sternum would withstand the heart's action, or when the artery lies along the spine itself, you would suppose that so firm a column as this would stop the heart's action. But it does not. The artery beats through the bone. There are twenty beautiful examples of this in the collection. We call them beautiful by a sort of license. Here are examples which finely illustrate this principle. The artery in this case has enlarged, and has come in contact with the spine, and the spine is beaten through; it is, in time, wasted and destroyed. Can there be a better example that no firm texture can withstand the heart's action,—that the only property which is capable of sustaining it is elasticity,—that the property of elasticity in the perfect artery is quite equal to sustain the action imposed on it? But when this elasticity is diminished, a dilatation of the vessel takes place, an imperfection of the circulation ensues, an aneurysmal tumour forms, and death results. I cannot give you a better example of how Mr. HUNTER intended to show the necessity of there being a due proportion of elasticity and of muscular power in the whole animal body. Muscular power is quite distinct from the character of elasticity, for elasticity is not power; it has no property but that which is derived from, or put in action by, the impulse which it receives.

I hope we shall now be prepared for understanding the nature of the living fibre.

CASE OF OSTEO SARCOMA OF THE LEFT

UPPER MAXILLARY BONE,

In which the whole of the Diseased Bone was

REMOVED BY M. BLANDIN,

Surgeon to the Hôpital Beaujon.

(*Reported by* M. LAPLACE, *Interne.*)

THE subject of this operation was a female, fifty-five years of age, habitually healthy, and the mother of several children, who enjoy good health; she affirms that she never contracted syphilis, and traces the commencement of her disease to six months back. At this period one of the left upper molar teeth became spontaneously the seat of excessive pain, loosened, and in a short time time fell out, leaving an opening which never closed since. At the same time two small fleshy tumours, as large as a pea, red, and smooth, developed themselves on either side of the fistula, which gave issue to a small quantity of puriform mucus, fetid, and sometimes mixed with blood. A surgeon being now called upon, made some trifling incision, which gave issue to some blood, and from that day the tumours gradually enlarged.

On being received into the hospital, 11th of March last, she presented the following appearance:—At the roof of the mouth there was a red, smooth, fungous tumour, but it was not ulcerated, and did not bleed; this tumour comprehended the whole breadth of the left upper maxillary bone, and occupied from before backwards the alveolar ridge and vault of the palate as far as the insertion of the velum palati. The whole alveolar ridge had disappeared, and was confounded with the body of the tumour, which was as large as the half of a hen's egg. Corresponding with the presumed situation of the second or third molar tooth there was an opening, furnishing a sanious, fetid pus, through which a probe might be passed deeply into the antrum. The left cheek was elevated by the tumour, which seemed to mount up to the base of the orbit in front, and to the side of the nose laterally. The globe of the eye on this side was not displaced; the patient experiences great intermitting pain in the tumour, and has been affected with headach, though not latterly; she coughs a little, and expectorates mucus mixed with pus from the alveolar fistula; the general health was not altered.

During the following days the little-finger could be introduced into the maxillary sinus through the fistula, and feel some irregular but smooth fungosities in the interior of that cavity, not a single point of its parietes presented the osseous resistance characteristic of a healthy state; the examination was followed by a discharge of blood; the progress of the tumour latterly had been very rapid; it had exceeded the median line to the right, and gained the inner edge of the right superior maxillary bone.

MM. Margolin and Blandin, seeing the quick manner in which the osteo sarcoma advanced, were of opinion that complete removal of the whole superior maxillary bone was necessary, and on the 18th of March M. Blandin, in the presence of several surgeons, proceeded to the operation.

The patient was retained in a chair by two assistants, and the operator placed himself before her, having on his left all the necessary instruments arranged in perfect order, and under the care of another assistant. The left half of the upper lip was put in a state of tension between the left hand of the operator and an assistant, and an incision was made, commencing over the os malæ, below and outside the external angle of the eye, and dividing the upper lip two or three lines in front of the left commissure. The coronary branches were now tied, and the threads cut close to the knots. The external flap, sufficiently dissected back to expose the anterior edge of the masseter muscle, was committed to an assistant; the internal flap was also dissected from below up, and from without inwards; the wing of the nose was separated from the maxillary bone, and turned up; the corresponding nasal fossa opened in front, outside, and below; the perpendicular process of the superior maxillary bone, and the base of the orbit, were exposed. The globe of the eye, with its cellular tissue, separated from the floor and inferior angles of the orbit, was pushed up by a spatula.

During this first period of the operation, the soft parts alone were intercsted; it now remained to separate the hard parts. The globe of the eye was carefully elevated inwards, together with the internal flap, while the external one was depressed in the opposite direction; a small hand-saw was now placed on the middle of the articulation of the superior maxillary with the malar bone; the flat of the blade being parallel to the median line, and directed from before backwards, regarded the anterior extremity of the inferior orbital fissure in such a manner, that the anterior angle of the os malæ was on the inner side,

and the malar process of the superior maxillary bone on the outer side, of the cut.

The anterior moiety of the osseous mass placed in front of the inferior orbital fissure being thus divided, the separation was continued as far as the latter fissure, with the gouge. As the instruments were now to be directed against the inferior and inner edge of the orbit, the globe of the eye was raised outwards, and the internal flap turned to the right side. The saw being fixed on the external face of the ascending process of the superior maxillary bone, divided it obliquely from above, downwards, and from without inwards, in an oblique direction, passing through the superior external and inferior internal angles of the orbit, and directed from before backwards toward the posterior third of the spheno-maxillary fissure. The ascending process having been thus divided by the saw, the separation of the bone as far as the spheno-maxillary fissure was completed with the gouge, following precisely the ethmoido-maxillary fissure of the orbit.

The osseous portion which was to be amputated being thus separated superiorly both on the outer and inner sides, still remained attached behind the tuberosity of the maxillary bone, at the vault of the palate and the wall of the nasal fossæ. The internal flap being raised sufficiently, together with the upper lip, the left index-finger was introduced deep into the mouth, which was kept open by means of a cork; the finger served to protect the velum palati and to direct a long strong pair of scissors, which were introduced from before backwards through the nasal fossæ, each fossa receiving a blade; the septum was thus divided parallel to its base, where the vomer is very thin.

The necessary number of teeth were now extracted, and the bistoury traced on the gum and roof of the palate the line which the saw was to follow. This instrument divided the superior alveolar edge parallel to the median line, and from before backwards. The section was completed with the gouge, by which the osseous portion of the roof of the palate was divided in its whole length. The left moiety of the velum palati was now separated from the rest by means of a transverse incision, which, passing along the posterior edge of the horizontal portion of the palatine bone, was directed between the pterygoid process and the maxillary tuberosity. The soft parts being thus divided, the gouge was employed to separate the superior maxillary and palatine bones from the sphenoid, acting obliquely from above downwards, and from without inwards. The tumour was now completely isolated, it could be seized between the fingers, and when all the soft parts were cut through, its removal was terminated.

The result of this operation, in which the internal pterygoid muscle was completely exposed, was the formation of a vast cavity where the left orbit, nasal fossæ, the pharynx, and mouth, all communicated. The parts were now cleaned with a sponge, and some fragments of the orbit and palatine bone, with some fungous excrescences, were removed; the edges of the wound were now brought together with eight strong pins, on which the twisted suture was placed; the cheek did not present any sensible depression.

The consequences of this difficult and long operation did not present anything remarkable, the termination being most fortunate; there was very little reaction, whether general or local; neither hemorrhage nor nervous symptoms supervened. During the first few days the patient expectorated some mucus, at the beginning mixed with blood, but soon becoming yellow. On the 21st we observed over the upper eyelid and left cheek a little redness and œdema, but these were quickly dissipated. The patient, whom we could not comprehend at all at first, was soon able to make herself well understood, though the voice was nasal. Finally, she was able to leave the hospital in the beginning of May, when she presented the following appearances:—

On the cheek a simple cicatrix. In the cavity of the mouth, a sort of perforation of the velum palati, establishing a communication between the mouth and nasal fossæ, permits us to see the septum and turbinated bones. This artificial perforation is limited in front by the cheek; behind by the left moiety of the velum palati; its edges are completely cicatrized. The left cheek is a little fallen in, and the left wing of the nose, being drawn closer to the septum than natural, diminishes a little the nostril of that side.

The examination of the tumour which was removed, perfectly confirmed the diagnosis; it was composed of true osteo-sarcomatous tissue, by which the greater part of the bone had been destroyed.

This case of complete removal of the whole of the superior maxillary bone, joined to a few other authentic ones which are recorded with the last years, proves that this operation, though in appearance dangerous and frightful, must take its rank amongst the other great efforts of the art to remove a disease otherwise inevitably mortal.

ACCUMULATION OF

AIR IN THE UTERUS,

SIMULATING PREGNANCY.

To the Editor of THE LANCET.

SIR,—You may, perhaps, deem the following case sufficiently interesting to merit a place in your valuable journal.

On the 3rd or 4th of last month (April), I was applied to by a widow, accompanied by her daughter, an unmarried female, nineteen years of age, under the following circumstances:—The mother stated that her daughter's health had been gradually declining for some months past, that she was suspected to be pregnant, and that she (the mother) wished me to decide whether she was so or not. The girl, who was of a naturally robust constitution, presented the appearances of impaired health. She was considerably emaciated; her countenance was sallow; tongue furred and white, pulse 84, and extremely small. She said that she had frequent vomitings in the morning, anorexia, and constipated bowels. She attributed the commencement of her illness to her having been suddenly exposed to cold and wet during menstruation six months previous; the catamenia were suppressed, and had not since appeared. About three months after this period she first perceived her abdomen to be preternaturally enlarged, and this enlargement had progressively increased up to the time of her application to me. It was then of the ordinary size of that of a female in the seventh, or the latter part of the sixth, month of pregnancy, and the uterus was distinctly felt to reach as high as the umbilicus. I applied the stethoscope to various parts of the abdomen, but no sound was discernible, having the slightest similarity to that of the placental or fœtal pulsations. The mammæ were flaccid, and the areolæ surrounding the nipples wanted that deep red colour which is so characteristic of pregnancy. A vaginal examination was positively refused; and, under all the circumstances of the case, I felt incompetent to form any decisive conclusion, whether the girl was pregnant, or laboured under some uterine disease.

After the lapse of three days I was again visited by this young woman, when, to my astonishment, I found the abdomen was reduced to its natural dimensions; the uterus was no longer to be felt above the pubis, and her health, she said, was much improved, her general appearance, indeed, very clearly proving this to be the case. The account she gave was, that on going to bed the first night after she had applied to me, she suddenly, to use her own expression, felt something burst in her inside, and instantly a profuse quantity of extremely fetid gas issued *per vaginam*, mixed, however, with a few small clots of blood. The flatus, she said, must have continued to discharge for at least two minutes, when she felt faint, and subsequently became quite insensible. The mother corroborated the testimony of her daughter, and stated such to have been the fetor of the gas expelled, that she found it impossible to remain in the same apartment with her daughter.

I much doubted the truth of this narration, and, suspecting that abortion had taken place, I determined to prevail on the girl, if possible, to allow me to make a vaginal examination, and, after a great deal of persuasion, succeeded, when I instantly found that the vagina was entirely closed by the hymen, with the exception of a small orifice, certainly not half an inch in circumference, through which the catamenia had escaped,—a strong proof that the girl had never indulged in illicit intercourse with the other sex, and, coupled with the other circumstances of the case, that the testimony of her and her mother was faithfully true. The girl, after this occurrence, rapidly regained her former health. The catamenia have once since appeared, and she is now, in every respect, perfectly well.

I am, Sir, your obedient servant,

J. JONES.

Gelly, Montgomeryshire,
May 21st, 1834.

ON THE

RE-UNION OF PARTS

AFTER LONG SEPARATION FROM THE BODY.

By MILES MARLEY, *Esq., F.L.S., Mem. Roy. Coll. of Surg.*

To the Editor of THE LANCET.

SIR,—Agreeing with you that cases of the above description are rare, and well knowing the scepticism of surgeons even as to the *possibility* of such re-union taking place, I am induced to offer my opinion from my own knowledge of the fact. However difficult it may prove for the physiologist to account for re-union of fingers, toes, ears, &c., when we have cases recorded by surgeons of undoubted veracity, it is scarcely fair to question the fact because we have not met with similar instances ourselves. The case related in the last Number of THE LANCET by M.

Beau, surgeon at the *Salpetrière*, Paris, is no doubt authentic. It is singular that I published one nearly similar in the *London Medical and Physical Journal* for June 1821, the outlines of which I shall take the liberty of transcribing.

A boy, about eleven years of age, had one half of the first phalanx of the index-finger of the left hand severed by a flag-stone. Half an hour elapsed before the separated part was re-applied. I employed the usual means,—strips of adhesive plaster; union took place rapidly. The nail came away, which was succeeded by a new one, and there was a perfect sense of touch in the part.

In M. Beau's case, there was likewise the usual nervous sensibility after union had taken place.

The other case recorded by you as related by Dr. Angelo, in the *Annal. Univ. de Méd.* for September last, I consider of equal interest. It is somewhat remarkable that his case so nearly resembles mine, the subject of it being a boy, who had injured the index-finger of his left hand, and I may add that the progress of the case in every respect was similar.

Dr. Merrem, a German physician, has made some extremely interesting experiments, the probable results of which may ultimately benefit the science of surgery. He experimented upon the head of a dog by making a circular incision through the integuments, and removed a piece of bone by the application of a trephine. The part of the cranium chosen for the experiment, was where the parietal bones join the occipital. The longitudinal sinus was opened as it enters the transverse sinus, and about three ounces of blood, or rather more, was lost. He then placed the circular piece of bone in its original place, and having united the integuments by suture, the wound was completely healed within two months, and in no way did this experiment interfere with the health of the animal. The dog was afterwards killed by poison (laurel-water), when, upon examining the head, the portion of bone which had been removed by the trephine, had perfectly united with that which surrounded it. A similar operation was performed on a cat, with the same success. Dr. Merrem is of opinion, that in a case where this operation might be performed for the purpose of evacuating matter formed within the skull, it would not be proper to replace the bone immediately, but where the formation of matter has ceased, he thinks we might supply the place of the original bone, by a piece taken from a sheep, a dog, or some other animal.

11, Cork Street, Burlington Gardens,
May 26th, 1834.

EMETICS IN PARTURITION.

To the Editor of THE LANCET.

SIR,—I will feel obliged by your inserting the following statement in the next number of THE LANCET, and am, Sir, your obedient servant,

B. R. SHANAHAN, M.D.,
Master of Lying-in Hospital, and Lect. on Mid. at the Eccles-street School, Dublin.

Lying-in Hospital Townsend-street, Dublin,
May 11th, 1834.

Having repeatedly perceived the beneficial effects of spontaneous vomiting in cases of natural labour, and regarding its action as useful by the relaxation which it produces, and not by mechanically bringing the diaphragm and abdominal muscles into action, and by that means assisting expulsion, it occurred to me, that if vomiting was excited by artificial means in cases of rigidity of the os uteri, vagina, or external parts of generation, so as to produce temporary debility, the abstraction of blood would in many cases be entirely obviated. With this impression, I have frequently tried the action of tartar emetic in cases of labour where the uterine contraction was unavailing, from the unusual rigidity of the parts, and found the treatment to answer my most sanguine hopes. Three grains of the medicine were dissolved in two ounces of water, and two tablespoonfuls were directed to be given every fifteen minutes until vomiting was produced.

If the practitioner be called to a patient labouring under inflammatory action either of the vagina or the os uteri, a result often produced by frequent examinations with the finger in the first stage of labour, he will find that the secretion with which the vagina is smeared, when in a healthy state, during labour, is wanting, or is small in quantity, and the parts feel dry and hot. The expulsive or dilating action may, according to the stage of labour, be powerful, though without effect, and, finally, the stomach becomes sympathetically affected, and vomiting is produced. As soon as vomiting has been excited strongly, a degree of debility is occasioned which causes relaxation, not only of the surface of the body, as indicated by a profuse perspiration, but likewise of the external parts of generation, which become ductile, the vagina secreting large quantities of the lubricating fluid, and the os vagina, which previously had been rigid, yielding to the uterine action, or to the finger of the practitioner. Blood in large quantities is often removed in such cases, to produce the necessary re-

laxation, and in very many of them stimulants are, from the great debility induced by the bleeding, afterwards necessarily resorted to. If, however, the administration of tartar emetic may be generally relied on, as I expect, the ill effects of taking much blood will frequently be obviated.

Cold Water as a Means of restoring suspended animation.—I will take this opportunity of adverting briefly to another subject. I have for some years, in my lectures at this hospital, taught the propriety of cold sprinkling the chests of children, when born in a state of suspended animation, or in cases where the respiratory function was not sufficiently active, conceiving it to be decidedly one of the best means we have for the purpose referred to. But it should not be applied at all on the face, as I have seen it, so directed, produce injurious and often destructive effects. Its application on the face suddenly suspends the respiration.

BLEEDING IN THE COLD STAGE OF

INTERMITTENT FEVER.

To the Editor of THE LANCET.

SIR,—I beg to forward you the following cases of intermittent fever, in which bleeding was employed in the cold stage as recommended by Dr. Mackintosh of Edinburgh, with the most successful results. May I beg the favour of their insertion in your valuable periodical. I am, Sir, yours respectfully,

SAMUEL LA MERT, Surgeon, &c.
14, Bury-street, St. Mary-Axe,
May 14th, 1834.

CASE 1.—M. Teulon, a printer, aged 45, of bilious temperament and spare habit, had been the subject of tertian intermittent fever for several years, which, from its continuance, had produced general derangement of his health. He had taken quantities of bark without producing any permanent effect, although it had relieved him from time to time, but immediately he caught cold he was certain of an attack. On the morning of Tuesday, November the 27th, 1832, I was called to see him, and found him in the following state. Yawning and stretching, with feelings of lassitude and debility, complaining of tightness across his chest, which rendered his breathing difficult and laborious. In a few minutes a complete rigor set in; teeth chattered; countenance lived; pulse 100, and much oppressed; extremities deadly cold; conjunctiva turgid; heat of trunk not below the natural standard. The sensations of cold now became almost insupportable, and he shivered to such a degree as actually to shake the bed he was lying on. I immediately determined to bleed him, although the man was frightened at my doing so, as, to use his own expression, he thought he required blood instead of abstracting any. However, I succeeded in persuading him, and with great difficulty (owing to the tremors) made a large orifice in the basilic vein. The blood at first oozed out by drops only; I then applied hot bottles to his hands and feet, and used friction to the arm, and had the satisfaction of getting a full stream in a very little time; and when about ten ounces had been abstracted, a gradual warmth was felt pervading the body, and the shivering had ceased. I tied up the arm, and in a few minutes the extremities became quite warm, the breathing free, the pulse 85 and soft. He here expressed great surprise at the relief which he had so suddenly experienced. I then had him lightly covered, and gave him the following:—

℞ *Magnes. Sulph.* ʒiss; *Liq. Antim. Tart.* ʒj; *Sp. Æther. Nitrosi* ʒiss; *Mist. Camphoræ* ʒiss. M. Fiat haustus ter die sumendus.

In an hour afterwards he fell asleep, slept for four hours, and awoke quite refreshed. The first thing he noticed was that no hot stage had supervened, but that he was in a gentle perspiration. This continued in a very light degree for about four hours; he passed a very excellent night, and the next day he was working in his office. He continued taking the draughts for one week. It is now nearly eighteen months past, and he has not had another attack, but is in the enjoyment of excellent health.

CASE 2.—January 20th, 1833. Mrs. N—, aged 58, living in the City-Road, had been in a bad state of health for some time. When she applied to me, she was complaining that every other day she was attacked with an acute pain in the head, accompanied with shivering and intense cold, which in a few hours gave way to excessive heat and thirst, and terminated in a profuse perspiration, when all pain and uneasy feelings subsided until the next attack. Bowels were costive, tongue foul, pulse 110, and on her telling me that she expected the paroxysm in the afternoon, I went to see her, and found her in exactly the state she had described. After the rigor had well set in, I opened a vein in the arm, and abstracted about

ten ounces of blood, with immediate effect, for the coldness and shivering ceased, and a gentle perspiration ensued. I then gave her the same draughts as in Teulon's case, and ordered her to be kept quiet, and have low diet.

22. Had felt better during the interval than hitherto. Tongue cleaner; bowels freely opened; the paroxysm came on in the evening, but not so violent as before. I again abstracted blood. The pulse previous to this was 60. After eight ounces had been drawn, it mounted up to 80. Heat again returned, and the pain in the head had completely ceased; no hot stage followed.

24. Had scarcely perspired at all after the bleeding, and during the interval had felt no weakness. Tongue clean; appetite improved; bowels open; about eight in the evening felt a sense of coldness, but not amounting to a rigor; pulse 70; pain in the head not half so acute as before. I again bled her, and took about twelve ounces, as I imagined I had not taken sufficient before. The result was here highly satisfactory; no hot or sweating stage followed. The next period of the attack passed over without any unpleasant symptom; she gradually recovered her strength, and has been in excellent health ever since.

Case 3.—Dec. 4, 1832. Mrs. Goodson, wife of a stable-keeper, aged 48, mother of seven children, complains that every other morning she has a violent pain in the head, accompanied by a severe rigor, which lasts about an hour, and is succeeded by a hot and sweating stage. The continuance of the disorder has produced general bad health, and œdema of the extremities; tongue is furred; pulse 100; no appetite. I gave her the following:—

℞ *Extract. Colocynth. c.* gr. xii; *Hydrary. Submur.* gr. iij. Fiant pilulæ tres statim sumendæ.

Dec. 6. This morning had a rigor, accompanied by all the symptoms of ague; after it had well set in, I opened a vein on the back of the hand, and applied a hot bottle to the palm. In a few minutes I obtained a good stream, and when six ounces only had been abstracted, the shivering ceased, the coldness gave way to a gentle warmth, the pain in the head vanished, and the breathing became free, and unaccompanied with tightness of the chest. In fact the change was so sudden, that the by-standers were amazed. The skin was moist, and bedewed with a gentle perspiration; no hot stage had followed.

℞ *Potassæ Nitratis* gr. x; *Liq. Ammon. Acet.* ℥ij; *Sp. Ætheris Nitrosi* ℥j; *Mist. Camph.* ℥ix. M. Fiat haustus ter die sumendus.

7. Had perspired freely; pulse 80, and soft; œdema of the legs rather diminished; had passed a great quantity of water; tongue cleaner: bowels open; felt better during the interval. Continue the draughts.

8. About noon had another rigor, which was very severe; was bled to 10 ounces with a decidedly good effect, no hot stage following. The blood in this instance was taken from the saphena vein. The bowels being costive, I gave her one ounce of castor oil, and ordered the draught to be continued.

10. In the morning pulse was 75; tongue quite clean; bowels had been freely opened, and had made a great quantity of water. Legs were diminished to one half the size they were previous to the first bleeding. In the evening had no attack, and from this period she convalesced; the legs became of a natural size, and she has since enjoyed excellent health.

Remarks.—The preceding cases must, on reflection, afford convincing proofs that bleeding is a safe, efficient, and certain remedy in intermittent fever in the cold stage. In Teulon's case it effectually prevented any hot stage following; and instead of an immense discharge taking place from the excretory vessels of the skin in the sweating stage, a slight perspiration merely ensued, and the next day he was in perfect health, engaged at his usual avocations. In the last case also, although œdema of the extremities had taken place, the effect of the bleeding was as decided as in the former. There are many who say that bleeding must do considerable mischief where the patient, having been long affected by the disorder, has become weak and debilitated. But they do not consider that the quantity of fluid which exudes from the skin in the sweating stage, is very considerable, and comes direct from the blood itself. In fact, nature herself effects the same process, by removing a load from the system, though at the expense of inducing far greater debility than the bleeding would in the first stage; added to this, by depletion in the first instance we prevent mischief occurring from irregular determination of blood to different vital organs, which frequently occurs in the hot stage, and lays foundation for future disease. It is as notorious as it is remarkable, that all those who have expressed their opinion

in opposition to this practice, have done so from imagination only; for had they founded their opinions on the proofs elicited by the trial of the remedy, they would doubtless have published them to the medical world long since.

ON THE CAUSE OF THE

HEART'S IMPULSE.

By E. L. BRYAN, *Esq.*, *Stowmarket.*

THE investigation of the heart's impulse requires a careful consideration of the mechanical states of the parts which are active, and of the parts which are passive, in its production.

The ventricles, the active parts, have two states; one in which their muscular fibres are relaxed, and do not compress the blood; the other, in which they are contracting, and powerfully compress that fluid. When in a state of rest, the ventricles have no determinate form, but may be moulded into any shape which the pressure of the parts in contact with them may happen to give them; they are soft and yielding, and a slight pressure upon any portion of their surface would cause a depression of that surface. For the sake of elucidation, let *Fig.* 1 represent the outline of the ventricles in a relaxed state.

Fig. 1

Suppose the end of the finger were pressed upon them at *a*, it would occasion a depression as represented by the dotted line.

In their state of action, however, the case is quite different, whatever might have been the form of the ventricles during their relaxation, on the instant their valves are closed, their powerfully compressed fluid causes them to take on the most rounded or spherical form which the arrangement of their muscular fibres will permit, and as this arrangement is permanent, the form of the ventricles is always the same during their active state. If it were possible to take a mould of the ventricles at the commencement of one beat, they would exactly fit that mould at the commencement of each following beat. Let *Fig.* 1 represent the ventricles when in action; pressure at *a* would now occasion no depression, because the heart, when contracting, is hard and resisting; but if the pressure had been applied when the ventricles were in a relaxed state, depression, as previously observed, would have occurred, and immediately on their action the ventricles, reassuming their own peculiar and rounded form, would either strike back the finger to *a*, or themselves recede in the opposite direction.

The parts which are passive in the phenomenon in question are those portions of the parietes of the thorax, which form the outward walls of the cavity containing the heart; and their mechanical state is of necessity connected with that of the cavity whose walls they assist to form. In this cavity (which I shall here call the heart's space) is contained the substance of the heart and the blood in its four cavities. Now the quantity of the heart's space occupied by the substance of the heart is the same, whether the muscular fibres be in action or at rest; but the blood in this (i. e. the blood in the heart's cavities) is constantly varying in quantity, or, at least, has a tendency so to do; because from this space blood departs with arterial force and velocity, while it enters it with venous force and velocity; the necessary consequence is, a tendency to vacuum in the heart's space, equal to the difference of the two forces. The inevitable effect of this tendency to vacuum in the heart's space is, that on the instant the ventricles have discharged their contents and become relaxed (the exact period at which the tendency to vacuum is greatest), those portions of the external parietes of the heart's space, which are sufficiently elastic to yield to a slight force, close in upon that space.

Let *Fig.* 2 represent the outline of a heart and a section of the parts in contact with it; let the line *a* represent the form of the ventricles when in action; when, powerfully compressing the blood, they are of their most rounded or spherical form. On the instant they have ejected their contents and become relaxed, the most elastic portions (*a*) of the external walls of the heart's space, close in slightly upon that space, as represented by the dotted lines, and depress the contiguous surface of the ventricles, the relaxation of the ventricles permitting the

Fig. 2

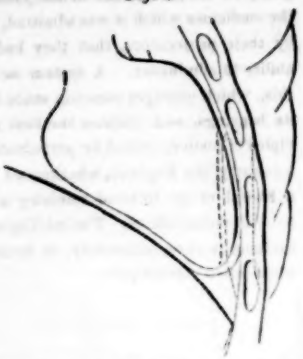
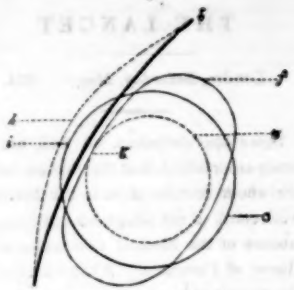


Fig. 3



depression, and the tendency to vacuum inducing it. At the next beat the ventricles, assuming, as already explained, their own rounded form, elevate the depressed portion of their surface, and, with it the parts which had produced the depression, and keep them elevated during their systole, at the termination of which the same depression again occurs, giving rise at the following beat to an equivalent elevation. The end of the fifth rib and the parts adjoining, are the place of impulse, they being the most elastic parts covering the heart, and, therefore, most readily acted on by the tendency to vacuum which the sudden exit of a portion of blood from the ventricles occasions in that space in which the ventricles are situated; the impulse is greatest at the intercostal spaces, because they sink in more extensively than the ribs themselves, and receive, of course, equivalent elevations.

In the enlarged heart there exists an additional cause of impulse, but it is of similar development; namely, the increased impulse arises from an increased depression of the surface of the ventricles, which occurs in the following manner:—The parietes of the chest afford more opposition to an enlargement of the heart than any other part in contact with it, and inevitably flatten the contiguous surface of the enlarged ventricles, which therefore take on a depressed form.

Suppose the dotted line *a*, *Fig.* 3, to represent the outline of a transverse section of ventricles of natural size, and the line *b* the parietes of the chest. Suppose these ventricles to enlarge; if opposed equally on all sides, they would take on the form represented by line *c*; but as the parietes *b* prevent enlargement in their direction, the ventricles become flattened beneath them, and assume the form of line *f g*. To this flattening of their surface the ventricles offer no resistance when in their passive state; but when they contract, and their powerfully compressed fluid renders them of spherical form (that is, of the form represented by line *c*), the depressed portion of the ventricles is elevated, as from *g* to *i*, causing elevation of the parietes to *h*. This elevation of the parietes is maintained during the systole of the ventricles—that is, as long as the ventricles are capable of maintaining their own peculiar and rounded form, with power sufficient to overcome the pressure of the parietes; but the instant the ventricles relax themselves, the parietes suddenly fall back to their former position by their own elasticity.

The heart's impulse, then, neither arises from a tilting motion of the heart, nor is a movement peculiarly appertaining to the heart's apex; for, from the causes to which I have attributed the impulse, any part of the surface of the ventricles coming in contact, either naturally or by displacement, with any elastic portion of the parietes of the thorax, would occasion impulse. This will be found, I think, in strict accordance with those changes which the impulse undergoes in disease and displacement of the heart.

Stowmarket, May 11th, 1834.

Ophthalmic Disease of the Rectum.—Sir Astley Cooper some time since performed the recto-vesical operation on a woman. A fistulous connexion existing afterwards between the rectum and bladder, Sir Astley, on meeting the patient's husband a short time ago, kindly inquired after her health. "Why, Sir," said the man, "she is pretty well, thank you, but the disease is a very great *eye sore*, and I wish it could be mended." The man was advised to take her forthwith to the Ophthalmic Infirmary.

THE LANCET.

London, Saturday, May 31, 1834.

Some apprehensions, we find, are already entertained, that the changes which are about to take place in the Ministry, will retard, if not altogether obstruct, the labours of the Medical Committee of the House of Commons. Whatever may be the constitution of a new ministry, it is next to impossible that any such disastrous result can happen. The state of medical law is such, that the inquiry must be continued under any circumstances. The wants of society demand the investigation, and it will be prosecuted to what we trust will be a successful conclusion, under the approving and all-powerful influence of public opinion.

We may here remark, *en passant*, that notwithstanding the recorded decisions of several of the judges, the Lord Chief Justice of England observed, in the Court of King's Bench, on Tuesday last, in the cause of Collins versus Carnegie, that it was necessary he should take time to consider whether a Scotch diploma entitled its possessors to practise south of the Tweed. It has often been stated in the pages of this journal, that the verdicts given under the direction of the judges against graduates in medicine and members of the Colleges of Surgeons, were *contrary to law*, that is, were in direct opposition to the spirit and letter of the Act of 1815, — a measure which it was intended should operate against *unqualified* practitioners, and not be made the instrument of persecuting well-educated individuals.

Physicians and surgeons have been prosecuted under this odious Act, not for maltreating their patients, not for writing prescriptions, but because they have been guilty of the great crime of compounding the medicines which it was admitted, even by their prosecutors, that they had the ability to administer. A system such as this, which outrages common sense in all its bearings, and violates the first principles of justice, cannot be perpetuated in a country like England, whether we have a liberal or an illiberal ministry at the helm of public affairs. The intelligence of millions is sure, ultimately, to force the units into a correct path.

Have the Board and Provost of the University of Dublin no compassion for servants who have grown old and imbecile in their service? Are they not, as ecclesiastics, the special physicians of the mind — the moral pathologists whose province it is to appreciate the condition of the human intellect, and to apply the remedies appropriate to its derangement or natural decay? Do they not, by virtue of their profession and vocation, inspired by divine and confirmed by human authority, assume to themselves the high office of supplying the spiritual wants of their fellow men, and of restraining those aberrations into which the age, the passions, the prejudices, and the infirmities of human nature, sometimes drive them? For what, but for the exercise of this exalted prerogative, has a bountiful Providence endowed them with so many thousand green acres in Kerry and elsewhere, that the *septem sapientes* or senior Fellows, alone, of the establishment know the actual amount of their revenue? To solace the afflicted with the means of temporal repose, and to make the miserable in mind happy, could have been the sole splendid destination of so much wealth, and of the noble pursuit which its holders follow. If, however, the circle of their benevolence be not as comprehensive as

their income is great,—if, in short, they do not allow their prudent sympathies to wander abroad into the wide field of human miseries in search of fitting objects of commiseration and relief, they ought surely to throw the mantle of their generosity over the manifest weaknesses of one of their own colleagues, and shelter him from the unavoidable pity, we had almost said contempt, of the profane multitude. Ought they (we put it to their discretion) to suffer, so long, their venerable but misguided brother, the Professor of Botany, to exhibit to the unfeeling observation of a class-room, the incapacities of senility, blending them with the commendable but inopportune manifestations of devotion? Have they no oratory, no private chapel, in which the eccentricities of fanaticism and the drivellings of decrepitude might be indulged in, without exposure to the sneers and scoffs of the unthinking portion of an University? They might surely have observed that the mind of this respected and ancient man was year after year wandering "farther and more far" from the objects and tuition of "profane" science to pursuits and prelections of a "sacred" and exalted nature. An attendance on his introductory lectures would have shown them that the thoughts of their author were constantly transferred from the "Lilies and Hyacinths" of Ballsbridge Garden to the glory and splendour of the "Amaranthine bowers" of the "New Jerusalem." His flights, indeed, on those occasions, from the appropriate subjects of his discourses, have of late been so frequent and so bold, that there could be no mistaking the malady under which he laboured, or the medicine required for his relief. Men of their calling, means, and discrimination in diseases of this kind, ought not to hesitate on the propriety of removing a man of greatly advanced years and religious tendencies from a chair, for performing the duties of which he has obviously lost all delight and ability, to some field in which he might, in place of making botanical excursions, and delivering religio-scientific lectures, to the great scandal of a medical audience, ascend the barrel as a propagator of doctrines which would find congenial disciples. At present he is obviously wide of his true vocation, theology; and as nature has triumphed over all obstacles, it would be right at once to rectify the error by his removal to an appropriate asylum, where the bent of his genius might be gratified without detriment to the science of botany.

We desire to speak with delicacy, but with humane earnestness, on this subject. We suspect that the aged professor would listen with willingness to the proposition,—that he himself would consent to be pensioned off from an office, the emoluments of which, of late, must have been decreasing. Were it not, indeed, for the protecting laws of the monopolists,—the university-ticket system, which goes to the length of compelling students in medicine to listen to sermons on the Prophets, when they should be occupied with disquisitions on the labours of LINNEUS and JUSSIEU,—Dr. ALLMAN might be discoursing to a wilderness. Science can afford to lose him, or we might be loath to suggest the abandonment of his profession. His contributions to botany,—his published books, essays, and discourses, since his appointment to the chair of that science in the University of Dublin—where are they? Alas! Dr. ALLMAN has been a barren tree indeed in the vineyard of botany. The very gardener of the University collection has distanced him as an author, for to the latter we are at least indebted for a catalogue of the indigenous plants of Ireland. This may form another useful subject of investigation to the Parliamentary Committee. An

inquiry into the circumstances attending the delivery of lectures or demonstrations in the University garden by Mr. MACKAY, will disclose the fact that those lectures or demonstrations are paid for by all pupils who wish to learn botany in this establishment, the students thus having to fee two professors instead of one. We impute nothing wrong to Mr. MACKAY, who is fully justified in teaching botany, and receiving remuneration for his instructions. We simply impugn the compulsion to pay twice for that which should be obtained for a single fee. For the present we resign the subject into the hands of the committee.

THE Aldersgate-street Dispensary people held their anniversary dinner at the *Albion Tavern*, on Wednesday last. CASWALL, WYATT, and ROWLEY, three of the unprofessional officers, were stewards on the occasion. What more ought to be said descriptive of the character of the feast?

It affords us the greatest satisfaction to be enabled to state that the humbug dispensary system is on the wane, and that the public are fast becoming sensible of the frauds which have been long practised on them through the instrumentality of these puff-shops of charity-mongers and worthless medical adventurers.

THE termination of the CONCOURS OF ACCOUCHMENS, Paris, was announced on Tuesday last, at six o'clock, in favour, as we had foreseen, of M. PAUL DUBOIS. The number of persons collected to hear the result was immense, and the announcement of M. DUBOIS's name, by the President, was received with an overwhelming shout of disapprobation.

Although we cannot but accord to M. VELPEAU, as indeed every one but his judges did, a great superiority over M. DUBOIS, we should, in justice, remark, that the latter evinced considerable talent during the severe trial to which he was submitted, and he will undoubtedly make an excellent professor. This, however, does not excuse the injustice done to M. VELPEAU, which is deeply felt by every one; and a subscription has been already opened to present him with a medal in commemoration of the esteem and sympathy which the conduct of the jury has excited in his favour. Four members voted for M. VELPEAU and eight for M. DUBOIS. Among the former, it is said, was M. DUPUYTREN, who absented himself from the last sitting, in order, as report goes, to show his disapprobation of the intrigues used in M. DUBOIS's favour.

UNIVERSITY OF EDINBURGH.

[*From our private Correspondent.*]

THE interest which is created here, respecting the proceedings of the PARLIAMENTARY MEDICAL COMMITTEE, increases amongst us in proportion to our ignorance of what is actually taking place. WILLIAM, the son of the well-known JOHN THOMSON of our University, has been closely watching the progress of the examinations, and the whisperings which are set in motion by the mystical "chair-maker," are of course all favourable to the conservative interests. It is well understood, however, that Father JOHN *trembles* at the *exposé* which will be made of the whole system of "chair-making," as some witnesses are already summoned, and others will be summoned, who are intimately acquainted with every circumstance which led to the creation of the Professorships of Pathology and Surgery.

You ought to be informed that many interesting particulars relative to the whole system of Edinburgh medical education may be elicited from Professor CHRISTISON whose intelligence and probity would enable the Committee, if their interrogatories be skilfully constructed, to elicit from that distinguished man, not only much that is true, but an account of every important item in our long list of professional jobbings and enormities.

DR. ABERCROMBIE is also summoned,

but you will find, that though he is a *Christian* by profession, he is not a *Christian* in practice. He is a sly fellow from Aberdeen, and has been too successful a *trader* in physic to advocate a change in the existing system, which undoubtedly has been a good one for *him*. No man has played his cards better towards acquiring the support of the "good" in early life. He resembles, in short, both in his professional and moral character, your BENJAMIN BRODIE the "little thunderer," and will no doubt join with that excellent man in his prayers before the committee.

We are at a loss here to account for your silence on the subject of some late most extraordinary and sanguinary exhibitions in the London hospitals, more particularly at a moment when we are all anxious to learn in what circumstance the superiority of the London *Pures* is to be found. Though we cannot boast of the scientific acquirements and legerdemain talents which may be requisite to enable a surgeon to go through such extraordinary performances as have been lately displayed at *Guy's*, *St. George's*, *St. Thomas's*, *St. Bartholomew's*, the *London*, and the *Middlesex* hospitals, yet *we* can boast of an occasional exhibition of genuine "*pure* surgery."

It is but lately that our surgical Leviathan operated in a case of hydrocele, when, in the full indulgence of his usual careless and theatrical style, he punctured the testicle! Hemorrhage ensued, and the "great" operator was subsequently obliged to *castrate* his patient!! Another operation was performed by the "great" man in a case of diseased knee-joint. In a word the limb was amputated, contrary to the advice of two other medical attendants. On dissecting the joint, the only disease discoverable consisted of a very small superficial ulceration of the cartilage, and this was cicatrizing!

P.S.—MACKINTOSH, LISTON, and Co., have just returned from St. Andrew's, where they have dubbed five candidates for University honours. Pretty well for a first performance! The dubbers are in ecstasies at their success.

PRIZES IN CHEMISTRY, L. U.

COMPLAINT OF THEIR ADJUDICATION.

To the Editor of THE LANCET.

SIR,—Hints of unfairness in the adjudication of the medals in the class of chemistry have been freely circulated through the University, and, no doubt, are rapidly spreading through the country. As publicity is the best means of ascertaining the truth of such reports, and, if false, of refuting them, allow me to state the facts upon which they are founded, and leave the professor of chemistry to explain.

On the day of examination, the professor recommended those gentlemen who expected to stand high, to remain in town a few days, as, if there should be an equality in the answers returned, he should institute a second examination. Accordingly on Monday, the 12th inst., at twelve or after, seven mottos were posted in the cloisters, with a request that the gentlemen claiming them would meet the professor in the laboratory for a second examination. This second examination is altogether practical: six only of the seven gentlemen appeared.

On Friday following the gold medal was adjudged to Potter, the private pupil of the professor, and the first silver medal to Bradshaw, the *only one* of the seven who was absent. I would ask the professor whether previously to the second examination he considered Bradshaw's replies equal or superior to those of the rest; and, if the latter, why he adjudged his gold medal to his private pupil. If the former, why he gave Bradshaw the first silver medal in preference to the rest. The professor said Bradshaw was absent in the country during the second examination from ill health. I say he was in town on the morning of that day on which the examination took place, and sufficiently well to have attended it.

Notice of the examination was given *publicly* only *the day before* it took place. Is it true that the professor privately informed one of the seven (whose writing he *must have known*) of it three days previously,—he whose motto is "Macte virtute esto?" Dr. Turner is highly respected by his class, but he will forfeit its esteem unless he explains these facts satisfactorily. I am, Sir,

A LOOKER-ON.

May 22nd.

LETTER FROM MR. POTTER.

To the Editor of THE LANCET.

SIR,—In answer to the observations of your correspondent "M." in the last No. of THE LANCET, I would say that the statements are untrue, and the insinuations are alike contemptible and ungentlemanly.

Your correspondent complains that I, being a private pupil of Dr. Turner's, should have contended in the examinations for prizes in chemistry. This objection, if made at all, should have been urged *before* the examination, because when the papers were sent in, the question to be decided was, which was the best paper? and not which was the best considering the advantages the writer possessed? With regard to the insinuations made by your correspondent, I am convinced that any one knowing Dr. Turner would reject with indignation the idea of his being capable of such partiality.

Your correspondent states that I "had simply and foolishly said that I depended on the second examination for the gold medal." This is untrue. The author, I suppose, has said this for me, to suit his own purposes, "though," to use his own expression, "far be it from me to think or hint such a thing."

With regard to the "*drugs*," which he says I "knew from constant sight and use," they were crystals or preparations of well-known substances, which had been repeatedly exhibited before the whole class, and they were so characteristic that any one who had seen them two or three times, would or ought to recognise them directly. In short, it is evident that the letter is the production of the pen of a disappointed writer, who gives vent to his mortification in raising suspicions as to the fairness of the decision. I remain, Sir, your obedient servant,

JOHN P. POTTER.

P.S.—Another of your discontented correspondents (in attacking the first silver medalist) ridicules the idea of testing for the presence of iodine and potassium *separately* in proving a substance to be iodide of potassium. I would ask him, how he would prove that a certain substance was iodide of potassium unless he established the presence of its elements? Or (to use his own illustration) how would he prove that a certain liquid was sulphuric and not selenic acid unless he proved that it contained sulphur? May we not reply to him in his own words, "Surely this does not argue the presence of much practical knowledge?"

LETTER IN SUPPORT OF THE ADJUDICATIONS.

To the Editor of THE LANCET.

SIR,—After reading your excellent remarks in the last number of THE LANCET relative to the distribution of prizes to students, now so universally adopted in our medical institutions, my attention was directed to a letter signed "A Medical Student," charging Dr. Turner with partiality in the adjudication of his prizes. The writer, although he has assumed a disguise, will be well known to all those who were present on the day of the distribution. Were it not that silence would imply a tacit acquiescence of the class in the statements made by the writer of that letter, I would not obtrude myself on your pages, but knowing your abhorrence of trickery and misrepresentation, I hope you will give this a place in your Journal. It is, indeed, presumption on the part of the writer of that letter, to say that the whole class is dissatisfied at the result; he no doubt is so, and vanity makes him believe others are. That such is not the case he will speedily perceive, if he have the courage to openly reveal his name. He next states that the gentleman who obtained the first silver medal, chose to absent himself from the second examination, from a lack of practical knowledge. This is entirely gratuitous, and, judging from the writer's own words, the practical knowledge he so much boasts of must be very small, as I will presently prove. Admitting him to have been seen at the University on the morning the notice was put up, it was at an early hour, and previous to the announcement of a second examination. He observed to his friends at the time, that he was going into the country for his health, and that it was not likely there would be a second examination, or it would have taken place earlier. There was a rumour, too, that no second examination would be necessary, which at once acquits this gentleman of any intention to shun it.

With regard to the other communication, little comment is required, as, judging from the style, it is dictated by the same head. The fact on which so much stress is laid of the gold medalist being a private pupil of Dr. Turner, argues nothing, as he was not the only one who, possessing the same advantages, contended for the prize. The epithets simple and foolish, applied to this gentleman, will not affect his merits or lower him in the esteem of those who know his abilities. I am at a loss to devise the meaning of the word "drug" as used by your correspon-

dent, for with drugs, in the literal sense of the word, they had nothing to do, therefore his practical acquaintance with them would avail him nothing.

I am, Sir,

A PUPIL.

London University,
May 21, 1834.

TEST FOR GOOD APOTHECARY SECRETARIES.

To the Editor of THE LANCET.

SIR,—The subjoined is submitted to your attention and reprobation, because it displays the folly and ungenerous spirit which actuates some men when dressed in a little brief authority. Your obedient servant,

A CONSTANT READER.

King's Road Chelsea, May 22, 1834.

"At a meeting of the medical officers of the *Chelsea, Brompton, and Belgrave Dispensary*, at the Dispensary House, May 14th, 1834, present, Dr. Boyton, in the chair, and Messrs. Woolley, Bowden, and Dickinson, it was resolved unanimously, 'That it is the opinion of the medical officers, that no gentleman should henceforth be admitted as a candidate for the vacant office of apothecary and secretary to this institution, who has not obtained a license to practise from the Society of Apothecaries, which is the legal and best proof of his possessing the necessary knowledge for performing the duties of the office.'

"W. M. BOYTON, Chairman.

"I perfectly agree with the above resolution. JOHN PERRY."

*** We need not reprobate. The resolution is self-reprobating.—ED. L.

MR. MACFARLANE AND THE APOTHECARIES' COMPANY.

To the Editor of THE LANCET.

SIR,—I have just received THE LANCET for May 3rd, and beg leave to correct a mistake into which your Yorkshire correspondent has fallen, viz., that I was admitted for examination at Apothecaries' Hall, London, on the strength of my Edinburgh diploma, *without an indenture of apprenticeship*. My Edinburgh diploma was received at the Hall, instead of the course of study ordered in the regulations of the Company; but I also served an apprenticeship of five years to H. Johnson, Esq., Fellow of the Royal College of Surgeons, Edinburgh. By noticing this communication as early as possible, you will oblige your obedient servant,

JOHN MACFARLANE.

Hutton Rudley, May 23, 1834.

INJURIES CAUSED BY AN ALLEGED QUACK.

To the Editor of THE LANCET.

SIR,—As you have always endeavoured, through the medium of your Journal, to expose and abolish quackery, I send you the following cases for insertion. I have the honour to remain, Sir, yours, very respectfully,

WILLIAM WALTHEW,
Mem. Roy. Coll. Surg., and Licen. of Apoth. Hall, London.

Holyhead, May 22nd, 1834.

An old woman belonging to this parish, and a patient of mine, whom I knew to be hypochondriacal, applied to me to have what she called a "wild wart" extracted from the side of her nose. I examined the nose and face minutely, without detecting the least change of structure, or any cause for her fancy. The symptoms dwelt only in the old woman's imagination. She said that it sometimes suddenly showed its head by the side of her nose, and that when she tried to grasp it with her finger and thumb, it would instantly run back, but that one morning she was beforehand with it, and just caught its tip, since which it has never appeared, but seemed to be enraged at the treatment it had experienced, ever since poking her nose from side to side, and dragging at her face like so many fiends. It also often got to the crown of her head, and there annoyed her exceedingly. I could not, although I saw her often, reason away this false impression; however, I promised if she would come to me whenever the wart made its appearance again, I would cure her.

A short time after this, I was informed that she had gone to a man in the neighbourhood of Slangefni, eighteen miles distant, who was famed for curing cancerous diseases. This man wilfully or ignorantly coincided with her whims, and set about treating her, but in the most barbarous manner. From what I can learn, he applied a paste made with some powerful escharotic (perhaps *potassa fusa*) across the bridge of her nose, which caused the healthy skin covering that part to slough away, and which he persuaded the old woman was the wart. At this she was rejoiced, notwithstanding all she had suf-

fered from the burning properties of the paste; her tormenter was now safely deposited in a tea-cup, well salted, for inspection, and in this state I saw it on her return home; her mind, after this, for a short time only was at ease, for she fancied some of the roots of the wart still remained. Accordingly, back she went to the man, and now has returned a second time most inhumanly treated. The cartilages of her nose are destroyed, portions of the nasal processes of the superior maxillary bones have exfoliated, the skin and muscles of the face up to the lower eyelids are eaten away, and she has become, from being a good-looking old woman, a most frightful object, a living monument of the butchery of a man who will most probably escape unpunished, as she is poor and friendless.

The second case is that of a woman in a more comfortable station of life, who was induced, through the celebrity the man had gained by the former case, to become his patient! She also consulted me, but was not satisfied, because I said her complaint was not malignant, and that it was an inflammation of the bones of her nose, of which she would get well by taking proper medicines. She has returned, a similar object to the former, the ala nasi on one side completely destroyed, the cartilages of the nose injured, and her face very much disfigured. She has since been my patient, and is now getting well by taking sarsaparilla and alterative doses of mercury.

This patient showed herself the other day to Mr. Kirby of Dublin, who was surprised that she should allow herself to be treated so barbarously, and took pains to convince her of her error. She also presented herself to Mr. Corbett, of the same place, who considered it a case of noli me tangere, barbarously treated. It was natural enough, upon seeing her extensive scars, for Mr. Corbett to fancy something had been the matter with the skin or other parts of her nose, to account in some way for the treatment she had undergone; I can, however, positively state that there was no cutaneous affection whatever, but merely pain in the bones of her nose, and that not severe.

IRREGULARITIES AT THE LONDON HOSPITAL.—*To the Editor of* THE LANCET.—Sir, The notices of the irregularities of the London Hospital Surgical Officers has, I think, occupied more space in your truly valuable columns than was necessary. The fact is, that since the death of Mr. Headington, there has been observed neither method nor arrangement as to the appointed time for the performance of operations generally, each surgeon operating when most convenient to himself. This has arisen from a want of unanimity and common courtesy existing between the surgeons, and the indifference they show to the pupils generally. To correct this inconvenience, I would suggest that the surgeons should not allow their private feelings to operate against their pupils' advantage, and that the latter should be more attentive to the hospital practice, and not absent themselves from the hospital during the stated attendance of the former. Hoping these hints may be useful, I am, Sir, yours very obediently,

SPECTATOR.

London Hospital, May 19, 1834.

GUY'S HOSPITAL.

TUESDAY last, the 27th, was a "field day" at this hospital. Four operations were performed in the theatre, three of which were justly named "capital operations." There were present, besides the surgeons attached to the hospital, many students from St. Bartholomew's, and some from the London University.

LIGATURE OF FEMORAL ARTERY.—The first operation, that of tying the right femoral artery for popliteal aneurysm, was performed by Mr. MORGAN, on Joseph Tomkins, a middle-aged man, who was admitted into Naaman's Ward on Friday last. According to the man's account the tumour has not been forming longer than nine weeks, but at the present time it has attained a considerable size. The operation was performed in the usual manner, at about the middle third of the thigh, the first incision being about three inches in length, and guided by the inner edge of the sartorius muscle. The artery was quickly exposed and secured. No dressing was placed on the wound whilst the patient was in the theatre, that step being deferred till he had been some little time in his ward. On visiting him some few hours after the operation, we found that he had dosed for some short space of time, and that he was tolerably free from pain; pulse good and skin moist, but he expressed a feeling of faintness.

LITHOTOMY.—The second operation was for stone, on a child about four years of age, performed also by Mr. MORGAN with much skill, and completed in about half a minute. Mr. MORGAN, as is his usual practice, used the curved staff and

knife. The calculus was of a singularly oblong shape, appearing to contain a long nucleus, to be finely tuberculated, and of a fawn colour, indicating its formation of lithic acid; but Dr. MARCET states, that in instances where the deposit surrounds a foreign body, the calculus most frequently, if not invariably, consists of the earthy phosphates.

AMPUTATION AT THE SHOULDER.—The third operation was an amputation at the shoulder-joint, performed very ably by Mr. BRANSBY COOPER. The case is worthy of notice in many respects. The necessity for this operation was occasioned by irritability of the stump. The patient was a female, aged about two or three and twenty. Four operations had already been performed on her arm, before her admittance into the hospital, but the extreme pain subsequent to them all, compelled her to submit once more to the knife for relief. She bore its application with unshaken fortitude. Her sufferings commenced a short time back, after a fall against a fender, when an injury inflicted on her left wrist rendered amputation at the lower part of the forearm necessary. Irritability of the stump supervened, and amputation was again performed, below the elbow; but even after this, irritability of the extremity continued, and soon afterwards, according to the girl's account, a portion of the nerve was removed. Still relief was not obtained, and she submitted to a third amputation, which was performed above the elbow. From this likewise no ultimate benefit was derived, and she therefore applied at Guy's Hospital, where amputation at the *joint* was performed at her own request. The proceedings on this occasion were as follows:—The patient was placed in a low chair, and had the subclavian artery compressed against the first rib by Mr. KEY. Two flaps were then made by Mr. COOPER, one on either side (an anterior and a posterior), thus dividing the deltoid muscle down its centre. The head of the humerus was then quickly dislocated from the glenoid cavity, and the axillary artery was left undivided until the knife was being brought out in the last incision. Only a very trifling quantity of blood was lost, and the operation was completed in the space of seventy seconds. A few sutures were used to keep the parts in apposition, which accurately adapted themselves to each other. Adhesive plaster, with pads of lint and bandage, were then applied, and the patient left the theatre, apparently not much exhausted. The mode of operating in this case differed from that adopted by Mr. TRAVERS at St. Thomas's Hospital, four or five weeks ago. Mr. T. in this case formed the chief flap from the deltoid.

TUMOUR OF THE JAW.—When this patient had been removed, a woman was brought into the theatre, with a tumour, which was situated beneath and upon the horizontal ramus of the jaw, evidently of the steatomatous character. It was removed by Mr. COOPER, but whilst detaching it with the knife some enlarged irregular branch from the facial artery was divided, and a large quantity of blood was jetted forth. This impeded the operation for a time, but the artery was secured and the operation speedily completed.

SMALL HOSPITALS.—There are only 15 beds in the hospital of Goettingen, and I do not wish for more. I do not think that the experienced practitioner is formed by the number of patients. Experience is the result, not of seeing merely, but of reflecting. It is not eating, but digestion, that gives strength. A physician who tells us that he visits a hundred and fifty, and even a greater number, of sick people daily, has, in my opinion, so little pretensions to the title of an experienced man, that I would even deny that he had any experience at all.—*Richter's Med. and Surg. Observ.*

CORRESPONDENTS.

A report of the proceedings at the dinner of the medical officers of the Army, shall appear in the next LANCET.

Will *H. T.* favour us with his name and address, preliminary to an interview?

The sentiments of *J. R.* are perfectly just, but as they are now entertained by every sensible member in the profession, it would be useless to devote any space at present to their farther diffusion.

G. J. P. should send us his full name and address to attach to his cases.

The letters of Mr. Parkes—Mr. Stringer—The Author of the "Suggestions," &c.—W. H. B.—Mr. Dermott—X. Z.—Mr. Willow—A Constant Admirer—H. B.—Davus sum non Œdipus—A General Practitioner—Mr. Wood, &c., have been received.

ERRATA.—Page 320, col. 2, line 37, *for* Mr. Ridout, Paternoster Row, *read* Mr. Ridet, Paradise Row.

In leader on the petitions last week, in line 1, closing paragraph, page 329, *for* deed, *read* deep. The error occurs in part only of the impression.

In leader, page 330, line 11, *after the words* for the term of one year, *add* for a payment of six shillings.